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Report on the Tin of the Province of Mergui. By Captain G. B. TREMENHEERE, Executive Engineer, Tenasserim Division.

1. The tin of this province has not been sought for since the Burmese took possession of the country from their Siamese neighbours. Under the rule of the latter, or during the period at which Tenasserim was an independent state, extensive works for tin were carried on. It occurs chiefly in the beds and banks of streams issuing from the primitive mountains, which form the principal feature of this peninsula ; portions of the banks of streams in which it is found are, in some instances, rivetted with rough stone-work, to confine the water for washing operations ; and the ground on either side, for many miles along their course, is penetrated by innumerable pits, from eight to ten and twelve feet deep. Traces of the work of many thousands of men are evident in several places. These pits are not connected with one another, but seem to have been sunk by separate small parties of men, to whom probably definite tasks were assigned, with a view of tracing the tin ground, and of extracting the gravel with which the tin is mixed.

Their variable depth, and the amount of labour expended on them, is a tolerable indication of the success with which this has been pursued, and of the places in which ground might be again perhaps opened with advantage.

2. The streams themselves are rich in tin, which may be collected from their beds in considerable quantities. The process by which it has been deposited for long periods, and for many miles along

the line of valleys through which they flow, appears to be in active operation at the present day. Crystals of the peroxide of tin washed down by the rivers, and deposited with sand gravel in their beds, may, by changes of the river's course during the freshes, be quickly covered with a few feet of gravel and soil. The older deposits have, as far as my observation extends at present, the same alluvial character, and it would be well in future operations to have regard to the levels in which the streams may have formerly run.

The first of these localities which attracted my attention, was the Thengdon river, issuing from the primitive mountains in the immediate neighbourhood of the coal mine on the Great Tenasserim river. I visited this river in the course of my survey of the coal basin, and found pits in great number along its banks, of the existence of which I had been previously informed, though the object for which they had been dug was not known to my informant. On washing some of the gravel from the bottom of one of the pits, a small quantity of tin was found.

3. A Shan was subsequently sent there, and collected 11,889 grains of tin of the native peroxide in the course of an hour and half. Specimen No. 1, which is equivalent to 19 ounces and 198 grains of pure tin.

4. After leaving the vicinity of the coal mine, I proceeded down the river, and was accompanied by the Shan, who had been employed in tin works in the Straits, and to whom several tin streams in the Mergui province were known. These are situated chiefly on the Little Tenasserim river, into which they empty themselves. The first and most accessible is the Thabawlick, which unites with the Thakiet three miles above the junction of the latter with the Little Tenasserim. The mouth of the Thakiet is eleven miles from the town of Tenasserim.

5. The access to this tin ground is by land in the dry season. Landing at the village of Thakiet, I proceeded on foot eight miles, and reached the Thabawlick, at the point indicated in the accompanying sketch.

6. The intervening ground is for the most part flat. After passing a marsh of some extent, there is a low ridge of hills, which presents, however, no obstacle to land carriage of any description. The face of the country is, as usual, except in marshy places, thickly covered

with jungle trees ; but the wild elephants' tracks are open and convenient. During the monsoon, boats carrying 100 bags of rice, can ascend the Thabawlick to the place alluded to, in one day. The tide is felt about six miles from its mouth.

7. Having arrived at the spot at a point known to my guide, and at which he had the previous year stationed himself for a few months, for the purpose of collecting tin, I found numerous pits and old cuttings, from which tin had been formerly obtained. It is found in layers of gravel immediately beneath the soil. The surface is undulating, and during the wet season, streams of water could have been conveniently conducted near the excavations, for the purpose of washing the gravel.

8. The guide stated, that crystals of tin could be in this manner separated by the hand without the usual aid of the washing trough. The rains not being at that time sufficiently advanced for that purpose, I did not succeed in obtaining any tin from the pits. The line of deposit of the richest stanniferous gravel has been probably influenced by many causes, and the chances of finding it are much the same as those to which other undertakings of this nature are subject. A few trials, however, across the low ground through which the hill streams pass, would enable the speculator to follow its course.

9. The time of the tin washer was, I found, much better occupied in seeking for tin in the bed of the river. He was assisted by one man, who disturbed the sand and gravel with his feet to as great a depth as he could thus accomplish, when a conical and shallow trough, about two feet in diameter and ten inches deep, was filled with the same, and washed in the stream by a circular motion, so as to get rid of the gravel and lighter particles, leaving the crystals of tin to collect, by their gravity, on the apex of the hollow trough. Each filling and washing occupied, on an average, six minutes.

One washing produced 1041 grains of native peroxide of tin in six minutes.

Specimen No. 2, equivalent to 1 oz. 335 grains of pure tin.

One do. do. 1265 grains of do. do.

Specimen No. 3, equivalent to 2 oz. 31 grains of pure tin.

One do. do. 1785 grains of do. do.

Specimen No. 4, equivalent to 2 oz. 430 grains of pure tin.

One hour's work apart from the above, 8,166 grains of pure tin.

Specimen No. 5, equivalent to 13 oz. 160 grains of pure tin.

Total of half a day's work, including the above, 25,406 grains, equivalent to 2 lb. 9 oz. 232 grains of pure tin.

Specimen No. 6, contains of the latter, 13 oz. 149 grains.

The price of labour in this province is 6 annas per day.

10. The produce of a day's labour of two men would be, according to the above trial, equivalent to 5 lb. 2 oz. 464 grains of pure tin, at the cost of 12 annas, exclusive of the expenses of reduction to the metallic state. This process, from the pure state of the mineral, is extremely simple and inexpensive. The tin collected in the trough would require one more washing to remove particles of sand, &c. and charcoal is the only fuel required for its reduction.

The pieces or ingots of tin in the shape of the frustrum of a cone, (Specimens Nos. 7 and 8,) which are manufactured at the Rehgnon mines, on the Pak Chum river to the southward, and exchanged there for goods at 4 annas each, weigh 1 lb. 2 oz. 383 grains; and their value at Mergui, where the average price of tin is 85 rupees per 100 viss, of 365 lbs. 4 annas 4 pie. The value therefore of 5lbs. 2 oz. 464 grains, or the day's work of two men, would be 1 rupee 8 annas 4 pie. The cost of collecting being 12 annas, leaves 12 annas and 4 pie for the cost of the reducing process, and for profit on the labour of two men.

11. On the morning after reaching the Thabawlick, I traced the tin ground for a mile in a N. N. E. direction. The pits are in some parts more abundant than in others; and I was informed that they occurred and were thickly scattered throughout the entire course of the river between that point and the hills from which it issued, at the distance of an entire day's journey, if the windings of the river are followed.

12. The pits have not been worked since the Burmese took possession of the country. At the head of the stream, there are said to be the remains of bunds constructed for distributing water for washing the tin, and the posts of a house still standing, which is supposed to have been occupied by a Siamese superintendent of the work there carried on.

The season was too far advanced to enable me to prosecute my inquiries towards the hills on this occasion, and my attention was

therefore confined to the spot from which I obtained the results detailed above.

13. Four other rivers emptying themselves into the Lesser Tenasserim, are said to produce tin, but none are so accessible as the Thabawlick.

The following are the names of these streams, with their distances from the Thakiet river :—

The Khamoungtang River, one day by the Little Tenasserim, and one march inland.

Engdaw River, no road through the jungle.

Kyeng ditto, two days by the river, and two days inland.

Thapyn ditto, three days by the river, and one march inland.

From the Khamoungtang specimen, No. 9, weighing 2,890 grains, was collected in ten washings, but I did not visit the place myself.

The size of the tin is larger than that collected in other places, though the produce is not equal in quantity.

14. After returning to Tenasserim, I visited Loundoungin River, where tin was said to exist, but it turned out to be Wolfran sand, which had been washed down from the adjoining slate mountains, and was lying on the surface of the sandy bed of the stream.

15. In proceeding down the Great Tenasserim River towards Mergui, I halted at Moetong, for the purpose of visiting a tin ground which was said to exist near the range of hills to the N. E. skirting the open plain in which this place is situated. On penetrating to the hill itself, I found it to consist exclusively of granite, with not a trace of another rock of any description. The dry beds of the water-courses consisted of granitic sand alone.

There were many excavations for tin on the face of the hill. Several loads of gravel from the bottom of the pits and from the beds of the water-courses were carried to the river and washed, but the out-turn of tin was very small. There is no water within convenient reach.

16. The next spot visited was Kahan, a small hill near the Zedavoun Pagoda, on the right bank of the Great Tenasserim River, 11 miles from Mergui. The tin occurs here under conditions differing much from that of the localities above mentioned.

Kahan itself is the highest portion of a low ridge of hills, not more than 200 feet above the level of the river: it is composed of a soft,

friable, white sand-stone rock, the upper portions of which are decomposed and irregular. The surface gravel does not contain tin. It is found in the crystallized form, interspersed in decomposed granite, forming a vein about three feet wide, which is enclosed by the white sand-stone rock, and dips down at a high angle with the horizon. Specimen No. 10, if its form be preserved, illustrates well the tin crystals imbedded in the decomposed granite, which are easily detached from the matrix. The Specimen No. 11, from the same vein, of a yellow colour, is considered the surest indication of the presence of the mineral, and lies below the white, No. 10. Large scales of chlorite occur with it, which as they are generally found where the tin is most abundant, is called by the natives the mother of tin. The face of the hill is in one spot scattered over with these, which appear to have been brought down from the vein, with other matter from which the tin has been separated by the usual mode of washing. It will be noticed, that the granite is completely decomposed, and that the crystals would be easily separated by washing. No tin has been raised here since the country came into our possession, but the locality has been known. It was worked during the Burmese rule, and valued as supplying the richest ore of tin. A Burmese residing near the spot, pointed out the place where his operations had ceased. He had followed the direction of the vein alluded to, as well as he was able, and had driven a gallery underground in an inclined direction upwards, till the bank above fell in, when the mine was abandoned. He stated, that he had procured considerable quantities of tin daily, and that he often found it in large masses mixed with the yellow ground above mentioned. Arriving at the spot where his work had terminated, I set people to excavate and find, if possible, the vein which had been described. It was reached after about two hours digging, at the depth of five feet from the surface of the cut in the hill, in which we stood. In about a quarter of an hour, a few baskets of the decomposed granite were removed down the hill, from which 3,900 grains of the crystallized peroxide of tin, equal to 63,176 grains of pure tin, Specimen No. 12, were collected; and the next day 23,400 grains, equal to 2 lbs. 6 oz., and 100 grains of pure tin were found in the same manner by one man's labour in excavating; one carrying down to the water, and a third washing.

17. This locality appears to be of very promising description, and I have little doubt that if the work were aided by ordinary skill and means, that a tin mine here would be productive. A vein of tin is, in fact, exposed to the day, and would only require for a considerable period of work the precaution of well-supported galleries and shafts, to allow of its contents being easily extracted.

The Kahan hill is, I conceive, an indication of a valuable repository of tin. It is but a quarter of a mile from the creek communicating with the river, which is accessible to any boats. Its proximity to Mergui, offers also great facility for the procuring of labour and supplies.

18. The localities, therefore, which appear to hold out the best prospects for tin are, first, for stream tin, the Thabawlick river and the Thengdon river; and for mine tin, the Kohan hill. They all produce tin of the same nature and quality; viz. crystals of the native peroxide, being a combination of oxygen and tin only.

19. No difficulty would be found in procuring labour from Mergui for carrying on tin works at either of these places.

20. The location of the coal mine on the Great Tenasserim river has given rise to much additional cultivation along the banks of that river, where there are many Kareen villages, from which parties on the Thengdon could be supplied. Fruit trees, not indigenous to the place, and other traces of a considerable population having once occupied its banks, are observable on this river. The banks of the Little Tenasserim are thinly occupied by Siamese villages. The country in this direction, except near the banks of the river, is utterly unpeopled, and appears always to have been so.

21. Communication by water from the Thakiet to the Thabawlick tin ground, is not open in the dry season, but the distance by land is short. The produce of two lines of country, that of the vicinity of the Great and Little Tenasserim rivers, passes the town of Tenasserim at the junction of these rivers, only 11 miles from the Thakiet, and no difficulty in procuring subsistence for working parties on the Thabawlick need be apprehended.

(Signed) G. B. TREMENHEERE,

Capt. Executive Engineer,

Tenasserim Division.

Moulmain, 31st August, 1841.

Report on the Manganese of the Mergui Province. By Captain G. B. TREMENHEERE.

1. During my stay at the Tenasserim coal basin, a piece of manganese ore (black wad) of good quality, was brought to me by a Kareen, who stated that it had been found accidentally in the bank of a stream called the Thuggoo, which enters the Great Tenasserim, seventeen miles below the coal site. Subsequently, several other pieces of the same ore were brought by Mr. T. A. Corbin, Assistant to the Commissioner from the Therabuen river, five miles above the Thuggoo, and from an intermediate spot, the locality of which had been previously known, and had been, I believe, originally pointed out by Lieut. Glover, of the Madras Army.

2. In proceeding down the river, I visited these spots, and found at each that a valuable bed of manganese ore existed close to the surface of the country. It had been apparently cut through by the action of the streams and river before mentioned, leaving a section of the bed of ore in their banks covered only by the debris of the banks themselves. Large quantities might have been carried away, but a few hand specimens only were taken, which sufficiently shew the nature of the deposit, and are fair samples of what might be easily collected.

3. The best Specimens, No. 1 and 2, are from the Thuggoo river and the bank of the Great Tenasserim. That of the Therabuen did not appear to be at the surface of so pure a quality, but the existence of the bed being known, it is perhaps premature to pronounce it an inferior ore, from the examination of specimens taken from a hole extending not two feet into the bank. No. 5 is a portion of manganese rock projecting into the Great Tenasserim river, near the mouth of the Therabuen stream.

4. For the localities above mentioned, I must refer to the sketch accompanying my report on the tin of this province recently forwarded.

5. Of the extent of these manganese beds, it is difficult to pronounce. The face of the country in which they are situated is flat, thickly overspread with soil, and with the densest jungle. It is not, as far I could perceive, intersected by many streams, which would afford

the means of tracing the mineral deposit. The Great Tenasserim river has passed through the manganese bed in one spot $2\frac{1}{2}$ miles removed from two other points at which it occurs to the north and south, at both of which it is likewise discovered near the surface by the action of the streams Thuggoo and Therabuen, the probability therefore is, that it is an horizontal deposit, covering many square miles. But without indulging in conjecture, there is sufficient at the localities referred to, to indicate large quantities of manganese ore, which could be collected by penetrating through the soil lying above it, and immediately near the spots in which it is now exposed to the day.

It occurs in the form of the black oxide, and is the manganese of commerce. It is largely consumed in Europe in the preparation of bleaching compounds, and when pure, is valuable to the manufacturers of glass.

The soft black ore, No. 1, is a hydrate of the peroxide of manganese, known under the name of wad. It contains of water two equivalents or 9 per cent.

Iron, 1.96 grains by analysis.

Its specific gravity is 1.47.

The specific gravity of the grey peroxide, No. 4, is 2.46.

(Signed) G. B. TREMENHEERE,

Capt. Executive Engineer,

Moulmain, 11th September, 1841.

Tenasserim Division.

Of a new species of Lagomys inhabiting Nepal, (with Plate,)—Lagomys Nepalensis, Nob. By B. H. HODGSON, Esq. Resident at the Court of Nepal.

Two fine specimens, male and female, lately received from Gosainthan, enable me to add the genus *Lagomys* to the Catalogue of Nepalese Mammals, and it may be remarked as characteristic of the enormous and sudden inequalities of elevation proper to this kingdom, that the tropical genus *Rhizomys*, and the arctic genus *Lagomys*, have been taken within 40 miles of each other.

The specimens of the latter genus just procured by me, were shot by my hunters on the margin of the sacred lake whence the Trisal Ganga River issues, and close to the verge of perpetual congelation. There were but a pair, of which both were obtained, as they moved about in the vicinity of the small natural cavity, or rocky fissure, that formed their abode. Their stomachs were full of fresh vegetable matter, like the contents of a hare's belly, nor was there near their abode any evidence of the hoarding propensities of the genus, or of a habit of digging for food. The height of the summer being the season at which the animals were taken, may explain the former circumstance however, but not the latter, and though it is said that these Rat-Hares dig for their food occasionally, I fancy this must be a mistake.

My species appears to be nearly allied to *Roylii*, and possibly may be identical, but I think not, and shall therefore give a summary description of it, which with the beautiful drawing of my painter, will serve at once to decide this specific distinctness or otherwise. Gosainthan, where the pair were killed, is not above 30 miles north of Catmandoo. No European has ever visited it; but as it is on the verge of the perpetual snow line, it cannot be much less than 16,000 feet above the sea.

The male of the pair is seven inches long from snout to vent, and the female half an inch less. The general appearance of the species is that of a Guinea-pig, but the natives of India, who know no such animal, liken it to a Rat, and as its Leporine teeth and soles (of the feet) are not obtrusive signs, the association of it to the Murine race seems natural enough. Its general likeness, for instance, to the *Rhizomys* or Bamboo Rat is very noticeable, particularly as the latter is apt to hide its tail. But a nice observer will at once mark the greater superior massiveness of the head in *Rhizomys*, together with the smaller eyes and ears, and will not be slow to refer these peculiarities to the highly fossorial habits of that genus.

Our present subject which, we shall name provisionally "*Nepalensis*," has a moderate hare-like head, but ears quite similar to those of the common Rat, with the exception of that small internal process near the conch,

which seems proper to the Lagomides. The ear is rather less than half the length of the head, is truncated, rounded, and nearly nude except on the anterior and incurved edge of the helix, where very short hairs are pretty closely set. The upper and outer pair of front teeth have a very deep longitudinal groove, so as to look like four instead of two, but neither these, nor the inferior pair are at all remarkable for size or strength, offering in this respect, a strong contrast to *Rhizomys*. The inner pair of upper teeth are palpable, but minute. The whiskers are long, and firm, reaching to the shoulders; the lips and the muzzle entirely furred: the eyes medial: the body full and cylindric: no vestige of tail: the limbs short, but fine, and of nearly equal length and strength before and behind: pentadactylous before, tetradactylous behind: the nails acute: the soles fully clad, except the termino-digital balls, and a tiny carpal pad placed a little behind the elevated thumb. The last named are the sole parts of the whole body, which are denuded of fur. The fur of the animal is Leporine in the general character, but softer and more silky. It is of one sort, about an inch long, and of uniform structure throughout each pile, or hardly perceptible, harsher in its apical portion. On the head and limbs the fur is shorter, more adpressed, and less silky. The general colour, internally, is blue black, but externally is deep bay from the snout to the mid-body, and black freckled with paler rufous, thence to the vent. Below the chin and belly are pale bay, and the limbs are the same. There is a pale spot, or tuft rather, at the outer base of each ear, and the mustachio is half dark and half light.

The following specific character may, for the present, indicate the animal:—

Lag. Nep. with broad, rounded, nudish ears, nearly half the length of the head, soles nude on the termino-digital balls only, and soft equable fur, which is dark bay from the snout to waist, and rufescently freckled, black thence to the vent: below and the limbs, paler bay; snout to vent 7 inches: head 2: ears $\frac{7}{8}$: palm (with nail) $\frac{3}{4}$: planta (with nail) $1\frac{1}{4}$: female similar, smaller, $6\frac{1}{2}$ from snout to vent. Habitat, Himalaya of Nepal.

Catmandoo, August, 1841.

Notice of a new form of the Glaucopinæ, or Rasorial Crows, inhabiting the Northern region of Nepal—Conostoma Æmodius, (Nobis type.) By B. H. HODGSON, Esq. Resident at the Court of Nepal.

Amongst the very numerous forms* presented by the 850 species of Birds already known to me as inhabitants of Nepal, there is one which I believe to be still new to science, and to belong to a group, of the occurrence of which, either in these mountains or in the plains at their base, I know of no other instance, save that of the ubiquitous tree Magpies.

The group alluded to, is the Glaucopin, or Finch-billed Crows of Swainson; and the single species I am acquainted with, tenants exclusively the immediate neighbourhood of the perpetual snows.

In the lower and central regions, our bird appears to be represented by the Timaliæ and Crateropi, to both of which, and especially to the former, it bears in much of its structure, the same close resemblance that it does also in its manners; for all these birds alike have lax feeble plumage, short rounded wings, longish, broad, frail subgradated tails, and very large, yet not typically, terrestrial feet, though the habits are essentially terrene and rasorial. But, whereas the Timaliæ and Crateropi have a more or less Meruline bill, slender, and provided with membraned and open nares. The present birds, which we shall denominate generically Conostoma, (κωνος et στομα,) have the massive bill and simple concealed nares of the Magpies. The bill of the Crypsirinæ vel Dendrocittæ, or tree Magpies in particular, has much resemblance to that of the Conostomæ, owing to the clear arcuation of its whole commissure, and to the perfect entireness of its tip. There are differences, however, between the two even in the bills, in as much as that of Conostoma is more compressed, with sides less tumid yet broader ridges; while in Crypsirinæ, the *other* members, such as the long gradated tail, short tarsi, and considerably pointed wings, indicate habits less terrestrial than those of our bird. Conostoma is clearly a typical example of the Glaucopinæ of Swainson,

* One of the most remarkable of these is the Cochoa of Nepal, and which was characterised by me under that name in the Journal for June 1836. The expert naturalist would immediately perceive what my inexperience then noted not, viz. that this is a typical *ampeline* form, requiring to be placed between Ampelis and Casmarynchus, though Swainson asserts that the group is exclusively American.

To this genus we have since given the classic name of Proserpinia. In the same number of the Journal is the description of yet another rarity, first discovered and described therein, and which Swainson has since called Nyctiornis. It is our Bucia hodie, Napophilus, a forest-haunting Bee-Eater. Mr. Swainson's name must merge in ours.



Conostoma Omodius $\frac{1}{2}$ Nat. Size

Foot and Bill full size

and its natural position would seem to be between *Glaucopis* and *Cypsinæ*. In manners the present species is a shy forester, adhering to the wilds, and tenanted the skirts of forests, where brush-wood as well as trees abound. Five or six birds are usually found together, chattering, hopping, and scraping on the ground, and resorting to the trees and shrubs chiefly for shelter. Their food is principally insects of the soft and imperfect kind in summer: but in winter they doubtless take some vegetable food. Their essential form may be characterised thus:—

Bill short, strong, conico-compressed, with broad rounded ridges and vertical sides; the culmen and commissure entirely arched, the tips equal, obtuse, and entire. Nostrils circular, unfossed, furnished with a membranous raised edge all round, and concealed by incumbent setaceous plumuli. Rictus provided with a close series of short bristles. Wings short, feeble, almost entirely rounded, the 6th, 7th, and 8th quills usually equal and longest. Tail slightly elongated, rounded, consisting of 12 broad simple plumes. Feet very large and strong, yet not typically ambulatory. Tarsi elevate, nearly or quite smooth, exceeding much the central toe and nail. Toes medial, unequal; fores basally connected, and outer lateral considerably longer than the inner. Hind toe large, depressed, exceeding the outer fore, and with its large nail reaching to the middle of the central toe and nail. Nails simple, large, scarcely so acute or so curved as in *Crypsirinæ*.

Habitat, the northern region close to the perpetual snows.

Type. *Conostama Cœmodius*, Nob. new.

Specific character.

Conostoma with head, neck, and body above dull olive brown, clearest on the secondary alars—below, paler, and passing into sordid slaty blue, which forms, everywhere, the interior colour of the plumage. Iris brownish. Bill dull orange. Legs slaty grey. Sexes alike. Bill to tail $1\frac{1}{2}$ inches : bill $\frac{7}{8}$: tail $4\frac{7}{8}$: tarsus $1\frac{11}{16}$. Central toe and nail $1\frac{4}{16}$. Hind toe and nail $1\frac{2}{16}$. Weight $3\frac{1}{4}$ oz.

Catmandoo, August, 1841.

*A Monograph of the species of Wild Sheep.** By EDWARD BLYTH,
Curator to the Asiatic Society of Bengal.

The arrival of various spoils of different species of wild Sheep, since my memoir upon this genus of animals was read before the (Zoological) Society, enables me now to clear up several points which I formerly left as doubtful, as well as to include some additional species in the catalogue, and to indicate still others as probably distinct, and therefore desiderata to which the attention of travellers and others should be directed.

1. *Ovis Polii*, nobis, (the Pamîr Sheep.) In the narrative of the celebrated Venetian traveller, Marco Polo, we read (in Marsden's edition, p. 142,) that upon the elevated plain of Pamîr, eastward of Bokhara, and which is 16,000 feet above the sea level, "wild animals are met with in great numbers, particularly Sheep of a large size, having horns three, four, and even six palms in length. The shepherds form ladles and vessels of them for holding their victuals. They also construct fences for enclosing their cattle, and securing them against the Wolves, with which they say the country is infested, and which likewise destroy many of these wild Sheep or Goats" (*Moutoni v. Becchi* or 'Boucs.') More recently, an animal called the *Rasse* was indicated, from report, in Sir Alexander Burnes's Travels in Bokhara, (vol. ii. p. 208), and its horns have since been transmitted to the Royal Asiatic Society, by Lieut. Wood, of Sir A. Burnes's party, through the medium of G. T. Vigne, Esq.† In this magnificent specimen of

* This memoir upon the species of wild Sheep, read before the Zoological Society in July, 1840, has already been reprinted, with copious annotations bringing the subject up to my then state of knowledge, in Taylor's Magazine of Natural History, for May and June, 1841, and upon my arrival in India I found it again in type, and have availed myself of the opportunity to communicate some additional information.—E. B.

† Burnes "was told that the *Rasse* is larger than a Cow, but less than a Horse, of a white colour, with pendent hair under the chin," and a portion of skin attached to the occiput of the frontlet in London is covered with white hairs. "The flesh," he continues, "is much prized by the Kirghizes, who hunt and shoot the animal with arrows. It is said to delight in the coldest climates, and a common-sized specimen will require two horses to bear its flesh from the field. This creature is called *Rasse* by the Kirghizes, and *Kooshgar* by the inhabitants of the low countries." Lieut. Wood, however, (in the Narrative of his late Journey to the Source of the Oxus, p. 368,) distinguishes between the "*Rass* and *Kutchgar*, the former having straight spiral horns, and its dun colour being of a reddish tinge." It appears to me that three different animals

a frontlet, I incline to recognize (though not without hesitation) the *Ovis sculptorum*, formerly described by me from a horn in the Museum of the (London) Royal College of Surgeons, but as the characters of that specimen, as I originally drew them up, have not

are referred to under these names, two of which are confounded together by the latter author.

The *Kooch-i-Koh* of Sir Alexander Burnes' drawings now before me, refers to my *Ovis Vignei*, and the same, I am enabled to state positively, is the "*Kutchgar*" of Lieut. Wood, being also the "*Koch*" of the Sulimani range between India and Afghanistan. I shall quote Lieut. Wood's description of it under the head of *O. Vignei*; although this gentleman possessed the horns of both the *Ovis Polii* and *O. Vignei*, he does not appear to have distinguished them, but probably considered the latter to be the same species with the other, having horns incompletely developed. "A skeleton of this animal," he observes, "and several complete crania, were deposited, I believe, at Loodiana," and the crania here alluded to, five in number, together with some loose horns, are at present before me, and pertain to *Ovis Vignei*. Lieut. Wood confirms the statement of Marco Polo, mentioning, that "we saw numbers of horns strewed about in every direction, the spoils of the Kirghiz hunter. Some of these (being probably those of *O. Polii*) were of astonishingly large size. * * * The ends of these horns, projecting above the snow, often indicated the direction of the road, and wherever they were heaped up in large quantities, there our escort recognised the site of a Kirghiz summer encampment." This was at 14,400 feet above sea level. It is curious, (though by no means a recent discovery,) that the Kirghizes shoe their Horses with, and make stirrups from, the horns of these wild Sheep. "The shoes are nothing more than a semi-circular piece of horn placed on the fore part of the hoof. When the Horse is in constant work, it requires renewal at least once a week."

The noble frontlet of *Ovis Polii* in the Museum of the London Royal Asiatic Society was labelled "*Rass*, or *Roosh*," but it obviously cannot be the "*Rass*" stated by Lieut. Wood to have "straight spiral horns," and of which "the dun colour has a reddish tinge;" this refers, in the opinion of my friend Mr. Vigne, to the *Markbur* of Kabul, or *Rawacki* of Little Tibet, a race of very large feral Goats allied to the domestic animal, which is figured by Sir Alexander Burnes under the name of *Markhor*, (the locality not being specified,) and of which a skull and pair of loose horns have been transmitted to the Asiatic Society from Loodiana, together with the before-mentioned specimens collected by Sir Alexander Burnes. The *Markbur*, as I was informed by Mr. Vigne, inhabits also the hills of Budukshan; and I may observe, that its massive horns vary much in amount of spiral flexure, from the tense spirature of those of the Caffrarian Impoof, (*Boselaphus Oreas*), or straight with a prominent ridge wound round them, to the corkscrew curvature of the horns of the Koodoo, (*Strepsiceros Koodoo*), which is their most usual form, though sometimes they describe a still more open spiral than in that animal, more as in the Addax, (*Oryx Addax*), or at least such specimens of the latter as have come under my inspection.

To recapitulate, I think it probable, firstly, that the *Rass* or *Roosh* of Pamir will prove to refer properly to the *Ovis Polii*, and may mention that the appellation *Rasse* is likewise bestowed in Java upon a small species of Civet, (the *Viverra Rasse*, Horsfield, or *V. Indica*, Is. Geoff, but not the *V. Indica* of British authors;) 2ndly, that the *Kooshgar*, *Kutchgar*, *Kooch-i-Koh*, or *Koch*, applies exclusively to *O. Vignei*, which is also the *Shá* of Little Tibet, but

hitherto been published; as its flexure, too, which suggested the appellation of *sculptorum*, would appear to form a less extended spiral than is perhaps normal, and the habitat of our present subject also proves to be different from that rather suspected with instance of the other, (namely, the Taurus,) I here propose to dedicate the present gigantic animal to the illustrious Venetian traveller of the thirteenth century by the name of *Ovis Polii*.

As compared with the Rocky Mountain Sheep of North America, the *Rass* or *Roosh* of Pamir differs in having the horns considerably less massive, but more prolonged, approaching more in character to those of the domestic *O. Aries*, but differing again from the latter, not only in their very superior size, but in having their two front angles about equally developed. As in the Rocky Mountain species, and I believe also the *O. Aries* normally, the pair at first diverge backward, descending to gyre round at a parallel with the axis of the body, and inclining, as they again spire backwards, more outward to the tip. The horns described were in their seventh year of growth, and measure 4 feet 8 inches in length, following the curvature, and $14\frac{1}{4}$ inches round at base, having the tips, which are continued round till they point obliquely backwards, 45 inches apart. The width of their upper plane is $3\frac{1}{2}$ inches at base, $2\frac{3}{4}$ inches at the distance of one foot from the base, and $2\frac{1}{2}$ inches at two feet distance from the base; the depth of the base inside is 5 inches, and distance apart of the pair, measured outside, where they gyre forward at a parallel, 21 inches. The years of growth are successively $15\frac{1}{2}$, $10\frac{1}{2}$, 13, 8, 5, 3, and the last (incomplete) 1, inches. The College of Surgeons' specimen, a single horn, was in its eighth year of growth, but measures only 4 feet 4 inches round the curvature; its depth towards the base is 6 inches, and greatest width, about the middle, $2\frac{3}{4}$ inches. The successive annual growths are $12\frac{1}{2}$, 9, 8, 8, 7, 5, $3\frac{1}{2}$, and the incipient eighth, 1 inch. It is curved in a spiral involution, and scarcely outwards for three-fifths of a circle, when it gradually inclines more so to the tip, the horn describing one circle and about a

not the *Sud* of Great Tibet, the latter being the *O. Nahoor*; and 3rdly, that Lieut. Wood's "*Rass*" refers to the *Markbur*, while the true *Rasse*, (*Ovis Polii*,) the horns of which were transmitted by him to London, does not appear to have been distinguished by him from the species which he rightly describes under the denomination *Kutchgar*.—E. B.

a third. When upon the head, it must accordingly have gyred considerably inward, instead of descending at a parallel with the other, as indeed is almost invariably the case with the domestic *O. Aries*. Both specimens are of a pale colour, and indented with rugged transverse striæ, in general half an inch apart. Considering, indeed, the differences of the two specimens, it is by no means improbable that they will prove to be of allied rather than of the same species, in which case my former name of *O. Sculptorum* might be retained for that to which it was applied.

2, 3, and 4.—The Museums of Western Europe do not, that I can learn, contain any portion of the Siberian Argali, *Ovis Ammon* of Pallas, that might serve for comparison with the Rocky Mountain Sheep of North America, *O. montana* of Desmarest; but as the Kamtschatka Argali is described as a distinct species, *O. nivicola*, by M. Eschscholtz, in his *Zoologischer Atlas*, (differing from the two preceding in its inferior size, and in wanting, it would appear, the pale disk surrounding the tail, so conspicuous in both the others,) the probability is thus enhanced, that the Siberian and Rocky Mountain species are not the same, however closely they may resemble. The descriptions of *O. Ammon* would seem to apply in every particular to the *O. montana*, though it is still probable that actual comparison of specimens would lead to the detection of some discrepancies, as generally, but not always, happens in like cases. I may notice, that while Mr. Drummond affirms that the horns of old rams of *O. montana* “attain a size so enormous, and curve so much forwards and downwards, that they effectually prevent the animal from feeding on level ground,” the same had previously been remarked by Strahlenberg of the *Argalis* of Siberia, and no doubt is equally observable in the *Rasse* of Pamir. The finest specimen of a head of the Rocky Mountain animal, of seven heads of adult males examined, is in the collection of this (the Zoological) Society, and gives the following admeasurements; horns 3 feet 5 inches over the front ridge, and $17\frac{1}{4}$ inches round at base, where the front angles are $4\frac{3}{4}$ inches apart. They number nine years of growth, which successively give 9, $7\frac{1}{2}$, $6\frac{1}{2}$, 5, $4\frac{1}{2}$, 4, $2\frac{1}{2}$, $1\frac{1}{4}$, and 1 inches. They are nearly equilaterally triangular, but bulge a little between the angles, having the inner or front angle obtusely prominent, the posterior

double, or forming a second plane at a slight angle with the superior one, and the inferior angle (if such it can be called) much rounded off: the greatest depth of the horn is about 6 inches; from base of front angle to tip they measure 11 inches; and the tips apart 26 inches. They are everywhere strongly furrowed across, more particularly in front, the intervals between the grooves swelling out considerably; and they gradually become, as in all the rest of the genus, more compressed to the extremity.

Of the *O. nivicola* of M. Eschscholtz, that naturalist writes: "The specimen described is a male in winter garb, measuring 5 feet (French ?) in total length, and 2 feet 5 inches high. Its outer coat is of a yellowish-grey colour, brighter on the under parts, and inclining to straw-yellow on the head and neck; the markings in front of the limbs are of a rust colour; horns equilaterally triangular, 3 inches thick at base, and gyring outwards to form one complete spiral circle, 10 inches in diameter, and having their points directed outwards and forwards; the upper and posterior portions of the horn are level, and marked with deep annual indentations, which successively measure 7, 6, 5, 4, 3, 2, 2, and $1\frac{1}{2}$ inches, making eight years of total growth, besides which, there are numerous minor indentations or ordinary cross striæ, but no protuberant intervals." From the figure they would seem not to bulge between the angles, as is usual, though not invariably the case, with the Rocky Mountain species; as also to be somewhat more tensely spiral, as if pulled a little outward. The appearance both described and figured at the base of the fore-limbs externally, I suspect to be nothing more than the *axilla*, that had been twisted outwards in the mounting of the specimen. M. Eschscholtz describes this animal to be very numerous on the mountains of Kamtschatka, residing upon the snow-clad heights in summer, and descending to the lower regions in winter. A notice of its Chamois-like agility occurs in the Narrative of Kotzebue's Voyage from 1823 to 1826.

In the 18th volume of the Asiatic Researches, (part ii.) Mr. Hodgson, of Nepâl, gives a figure of a horned female of the Nahoor Sheep, and also of the skull and horns of a young Ram, which he erroneously refers to that species as since described by him. He also mentions having once possessed a pair of the horns, which he "could only lift

from the ground with a considerable effort ;” but it is necessary to observe, that the description which he gives in the volume adverted to, of the mutilated skin of a young wild Ram, procured in mid-winter, refers evidently to the Nahoor, and not to the species with horns having a triangular section, which is the subject of the present notice. According to Mr. Hodgson, the horns of this young specimen are “equilaterally triangular,” as the figure likewise represents ; whereas the Rocky Mountain species would at the same age have much compressed horns, far from attaining to an equilateral triangle. Should a true species be here indicated, as is not improbable, distinct from *O. Ammon*, I propose that it be dedicated to that assiduous investigator of Nepalese Zoology, and be accordingly termed *O. Hodgsonii*.*

* This animal has since been more elaborately described and figured by Mr. Hodgson, under the appellation *Ovis Ammonoides*, (vide “Journal,” ante, p. 230,) but except that no notice is taken of the pale disk surrounding the tail, as in the true Stags, which is a very conspicuous feature in the Argalis of Siberia and North America, and that the ears and tail would appear to be rather longer at least than my notes specify of the Rocky Mountain animal, (for, unfortunately, I have not Pallas’s *Spicilegia* now to refer to, for the very complete description of *O. Ammon* furnished by that able naturalist,) I cannot perceive in what Mr. Hodgson’s alleged species differs from the latter, and very much incline to the opinion that it will prove to be no other. The *O. Ammon* is described to be common in the Mongolian, Songarian, and Tartarian solitudes, inhabiting chiefly the lower ranges of the mountains, and it may be that Mr. Hodgson’s specimens are trans-Himalayan, and were perhaps brought from a very considerable distance to the North-eastward. I mean to supply, however, some representations of (atleast) the Rocky Mountain animal, which, together with the following description, will probably enable Mr. Hodgson to arrive at a more decided opinion on the subject.

The Argali of either continent approaches the European Stag in the size of its body, but is lower on the legs ; having a pale disk, as large as in the Wapiti, surrounding its very short tail ; and truly enormous horns (as described in the text,) attaining to a circumference of sometimes more than $1\frac{1}{2}$ foot at base, with a length of 4 feet over the spire. (The American pair to be figured is the same as that described in the text.) Its colour is pale greyish fawn, or light chocolate-brown in younger individuals which have their coat newly renovated ; with the generic dark markings on the face, chest, and front of the limbs, more or less developed : there is a ridge of lengthened hair on the back of its neck ; and the chaffron of the male becomes excessively bombed with age, contrary to what has been asserted.

A recent American specimen, with horns $3\frac{1}{2}$ feet long, measured 6 feet from nose to tail, and was 3 feet 8 inches high at the back ; from nose to base of horns $9\frac{1}{2}$ inches, ears $4\frac{1}{2}$ inches, and tail 4 inches. A large Asiatic Argali, with horns 4 feet (Russian) in length, and one of which weighed 16 Russian or 15 English pounds, was $6\frac{1}{4}$ feet (English measure,) from nose to base of tail, and weighed 310 medical pounds ; the female is a third smaller, and a fine Asiatic individual weighed $209\frac{1}{2}$ medical pounds. The horns of a large American male have already been described, and

5. *O. Californiana*, Douglas.—The Jesuit Missionary, Venegos, observed in California “a kind of wild Sheep, the size of a calf of one or two years old, with extraordinarily thick horns, resembling those of a common Ram, and *tail shorter than that of a Stag*,”

those of the female, (as plainly appears from Pallas’s figure of this sex,) though proportionately diminutive, become somewhat bulky towards the base in full grown specimens, assuming thus a corresponding character to those of the male.

The coat of the (American) Argali, observes Dr. Richardson, “like that of the Rein Deer, is, on its first growth in the autumn, short, fine, and flexible,” *i. e.* when the future tips of the hairs are alone put forth; “but, as the winter advances, it becomes coarser, dry, and brittle, though at the same time it feels soft to the touch. At the latter season the hair is so close at its roots that it is necessarily erect. Its colour is pale umbre or wood-brown, except on the buttocks and posterior part of the belly, which are whitish; a deeper and more shining brown prevails on the anterior aspect of the legs,” the chest, fore-neck, and face; “the short tail is dark brown, and a narrow brown line, extending from its base, runs up through the white disk to unite with the colour of the back. As the ends of the hairs (in which the colour resides) are gradually rubbed off during the progress of the winter, the tints become paler, and the old rams are thus almost white in the spring.” At this latter season, analogy indicates that the Argali again changes its coat, to assume a distinct summer garb, which (if I remember rightly) is described by Professor Pallas. According to this naturalist, an Asiatic lamb, of about three months old, and weighing 84 medical pounds, measured 3 feet from nose to tail, and 2½ feet high: it much resembled a young kid, except in shewing a large flat protuberance at the place of each horn, and was covered with frizzled woolly hair of a dark grey colour, and which, on some parts, was 4 or 5 inches long.

Like all the domestic breeds of Sheep, when left at liberty to follow their own inclinations, it has been observed that the Asiatic Argali purges itself in the spring with *Ranunculaceæ* and other acrid plants, until vegetation of a milder kind begins to spring up, and shrubs to sprout, which, with alpine plants, constitute its ordinary food. It frequents the salt-marshes which abound in Siberia, and licks up the salt efflorescence diffused over the ground; and the American animal is described by Dr. Richardson to pay daily visits to certain caves in the mountains, situate in slaty rocks, that are encrusted with a saline efflorescence of which they are fond.

Upon the Rocky Mountains of North America, the Argali, according to Dr. Richardson, “frequents elevated and craggy ridges, and collects in flocks consisting of from three to thirty, the young rams and the females herding together during the winter and spring, while the old rams form separate flocks, except during the month of September, which is their rutting season. The ewes bring forth in June or July, and then retire to the most inaccessible heights. Their favorite feeding-places are grassy knolls, skirted by craggy rocks, to which they can retreat when pursued by Dogs or Wolves. Mr. Drummond informed me, that in the retired parts of the mountains, where the hunters had seldom penetrated, he found no difficulty in approaching the flocks of this species, which there exhibited that simplicity of character so remarkable in the domestic breeds; but where they had been fired at, they were exceedingly wild, alarmed their companions at the approach of danger by a hissing noise, and scaled the rocks with a speed and agility that baffled pursuit.”

whence it would appear that the Rocky Mountain species, or a near ally, is here alluded to. Mr. Douglas describes the Californian Argali to have a tail 18 inches long (vide Zoological Journal, vol. iv. p. 332.) Its length, he observes, from nose to base of tail,

In Asia, the Argali is described by Pallas to affect the bare rocks, upon which it is constantly found basking in the sunshine; preferring a temperate climate, though its range extends northward to a very severe one. No animal is more shy, and it gradually abandons a country in proportion as it becomes peopled. It is almost impossible to overtake it upon the ground which it chiefly frequents, as it retreats upon the least alarm in the direction of the most inaccessible crags, scrambling up and over the rocks with surprising agility, but ever and anon stopping to gaze at its pursuers, and successively veering from side to side as it runs, in the same manner as the domestic animal. The adults are quite untameable, but the lamb becomes perfectly domesticated if taken young. In autumn, when these animals descend from the mountains, they are fat and in high condition, but in spring they are very lean, for want of choice food, when they return to the sunny glens of the high mountains. Their lambs, one or two in number, are born before the melting of the snow; and the males butt at each other for the possession of the females in precisely the same manner as the domestic ram.

The flesh of the Argali is pronounced by all who have tasted it, when in season, to be equal, if not superior, in flavour to the finest English mutton; and the same is remarked of other wild species of this genus; though, when out of season, they would appear to be tough and of rank flavour, on which principle may be reconciled a variety of conflicting testimonies.

The Argali formerly inhabited the country about the river Irktsch, as well as other parts of Siberia, where it is now no longer met with, since colonies have been planted in those dreary regions: at present it is chiefly known to abound in the territory to the eastward of Lake Baikal, extending northward on the banks of the Lena to lat. 60°. Its identification to the southward, upon the eastern Himalayas, and consequent presumed diffusion over the intervening mountain ranges, between the great sandy deserts on the west and the frontiers of China, is therefore not improbable. In America, its most closely allied representative, if it be not the very same species, is confined to the western side of the Rocky Mountains, as in Asia it inhabits the opposite eastern region; being found, according to Dr. Richardson, upon the lofty chain of the Rocky Mountains, inhabiting from its northern termination in lat. 68° to about lat. 40°, and most likely still further south. They also frequent the elevated and craggy ridges with which the country between the great mountain ridge and the Pacific is intersected; but they do not appear to have advanced further to the eastward than the Rocky Mountains, nor are they found in any of the hilly tracts nearer to Hudson's Bay. (*Fauna Americana-borealis*.) More recently, the same naturalist writes (in the Zoological Appendix to Capt. Beechy's Voyage)—"This species inhabits the timbered parts of the Rocky Mountains, and the hilly countries between that range and the Pacific, from North California to the 62d parallel." He there expresses his opinion that the Kamtschatka species, as described by Eschscholtz, "appears distinct;" and it may be that the two are found together in the territories of the Tungusi, as the Californian species would appear to coexist with the ordinary American Argali in the region adjacent to the Columbia river: these latter are doubtless frequently confounded together.—E. B.

is five feet 10 inches; height of the shoulders 2 feet 8 inches; girth behind the shoulders 6 feet; head 16 inches long, 7 [to] between the eyes, and 9 [to] between the horns; ears erect, $1\frac{1}{2}$ inch [$4\frac{1}{2}$ inches?] long, obtuse. The horns deposited in the Museum of this (the Zoological) Society, bear a general resemblance to those of the Rocky Mountain species, but are smoother, and form a much more open spiral: the terminal third is very much compressed, the medial intermediate, and the basal very thick and triangular: they were only in their fifth year of growth, and would doubtless have attained to much greater dimensions. Their length is 32 inches, measured over the front-ridge, and girth at base $14\frac{1}{2}$ inches, having a span of $12\frac{1}{2}$ inches from base to tip inside: from the tip to first annual depression they measure $12\frac{1}{2}$ inches, and then successively $6\frac{1}{4}$, $5\frac{1}{2}$, $4\frac{3}{4}$, and the incipient fifth year's growth 2 inches. They do not bulge between the angles, which are rather obtuse, and, as usual, are transversely striated. Approximate distance of the tips apart 33 inches.

"From the testimony of the Indian tribes about the Great Falls of the Columbia River," writes Mr. Douglas, "this species appears to inhabit the subalpine regions of Mount's Wood, St. Helen's, and Vancouver, but is more numerous in the mountainous districts of the interior of California. The only good skin that ever came under my observation was in lat. $46^{\circ} 14' 55''$, and long. $121^{\circ} 17' 0''$. Forbes, in his recent work on California, appears to allude to it by the name of *Berindo*, which in Mexico is applied to the *Antilocapra furcifera*.* He quotes, however, the description by Venegos, including the statement that it has a short tail, and remarks, that "they still abound in the plains at the foot of the mountains, and are always found in large herds." It does not, from the context, appear to me that the prong-horned animal is intended.

* In reference to the name which is here employed, Colonel Hamilton Smith has stated, in one of his letters to me, "that when I first shewed my drawings and description of this animal in Paris, it was totally unknown, and my account was disbelieved; Geoffroy St. Hilaire telling me 'vous permettez qu'on doute.' That description, with the drawing, was then already before the Linnæan Society, and after twenty months, when Mr. Ord's account had come out, they at length published mine," &c. This animal is the *Dicranoceros* of Colonel Smith, *Antilocapra* of Ord, and *Mazama* of Ogilby.—E. B.

From these we might proceed, through the domestic *Aries*, to the species generally typified by the *Monfflon* of Corsica ; but I shall interpolate a small group from the Himalaya, and apparently Caucasus, distinguished by having smooth and sub-cylindrical horns, that form a bold arc outwards at nearly right angles with the axis of the body, and have the tip turned backward. Such is .

6. *O. Nahoor*, Hodgson.—The Nahoor or *Nervati*, and *Snà* (not *Shà*) of Tibet. Size of the larger breeds of tame Sheep, with pale horns; and general colour dull brownish grey in old animals, with the ordinary dark markings on the face, breast, and limbs, more or less developed. Younger specimens, more particularly, have their coat, when renovated, tipped with a light fulvous tint, deeper along the middle of the back ; the tail is bushy, and conspicuously white, its medial portion generally dark. Length, as given by Mr. Hodgson, 4 feet from nose to base of tail, and height of the back 32 inches. A female was 3 feet 4 inches from nose to tail, and stood 29 inches high at the shoulder. From nose to between the horns a male measured $8\frac{1}{2}$ inches ; the ears $4\frac{1}{2}$ inches ; and tail 4 inches, or 7 inches to the end of the hair. A pair of horns in the Museum of this Society, which are far from having attained their full growth, measure 12 inches in circumference at base, and $20\frac{1}{2}$ inches long over the curvature, having their tips 27 inches asunder : their successive annual growths were respectively $6\frac{1}{2}$, 4, 3, $2\frac{3}{4}$, $2\frac{1}{2}$, and $1\frac{3}{4}$ inches.* Those of a very old female in the British Museum, have precisely the same curvature as in the male, only that the tips do not turn so much backwards ; they are, however, much compressed, and measure $9\frac{3}{4}$ inches long, $4\frac{1}{2}$ inches round, with the tips 14 inches apart. Another female, in the collection of this (the Zoological) Society, is entirely destitute of horns. The latter, and a young male which I formerly examined at Mr. Leadbeater's, accorded perfectly with the description by Mr. Hodgson, having pale slaty blue hairs, deeper on the back, and tipped with a rufous tint, more particularly on the back, which caused

* A handsome frontlet now before me, whereof the horns are in their tenth year of growth, gives the following admeasurements. Horns $24\frac{1}{2}$ inches long over the curvature, and $11\frac{1}{2}$ inches round at base, with the reverted tips 26 inches asunder. In another, but 7 years old, the horns measure $12\frac{1}{2}$ inches round at base, with a length of $23\frac{1}{2}$ inches. The annual growths of the former are successively $8\frac{1}{2}$, $2\frac{3}{4}$, $2\frac{1}{2}$, 2, $1\frac{1}{2}$, $1\frac{1}{4}$, $1\frac{1}{4}$ and 1 inches.—E. B.

the animal to appear of a pale fulvous or isabelline hue. An old male in the Museum of the Linnæan Society,* and the aged female in the British Museum, together with another skin which I have seen, have not only no trace of this colour in their present state of *pelage*, but I doubt whether they shewed much of it when their coat was new: the colour of all three is a dingy grey-brown, not easy to express in words.

The horns of the Nahoor differ but little in flexure from those of the next species, but may nevertheless be distinguished by many differences, in general strongly pronounced; as their superior size; the greater proportional thickness of the basal half, beyond which they narrow somewhat abruptly; the flatness of their dorsal aspect, with a much more acutely raised ridge along its middle; and by the comparative sharpness of all the angles, together with the existence, generally, of some traces of cross-striæ, more particularly towards their compressed tips; whereas the horns of the Burrhel Sheep are much less angular, of a deep rufous-brown colour, and quite smooth. Those of the female Nahoor described were entirely destitute of cross-furrows; but all have the marks of annual growth conspicuously indented.

This species, according to Mr. Hodgson, "inhabits the Kachâr region of Nepal, northward of the habitat of the Jharal Goat, amid the glaciers of the Himalaya, and both on the Indian and Tibetan sides of that range." Mr. Vigne informs me, that it is plentiful in Great but not in Little Tibet. I suspect that it is never found at so considerable an altitude as the next species.

7. *O. Burrhel*, nobis.—Smaller and more robust than the Nahoor, with shorter ears, and very dark horns; having no white upon it; and general colour dark and rich chestnut-brown, or mahogany, with the ordinary black markings upon the face, chest, and front of the limbs, very distinct; tail apparently minute.

This handsome species bears pretty much the same relationship in appearance to the Nahoor, which the English breed of South Down domestic Sheep bears to the Leicester breed, except that there is

* Mistaken for *Ovis Ammon* in the *Fauna Americana Borealis*, vol. i. p. 274, nap for a second specimen of *O. Burrhel* in part 6, p. 79, for July 10, 1838, of the Proceedings of the Zoological Society.—E. B.

not so much difference in size. Length, of the unique stuffed specimen in the Museum of this (the Zoological) Society, from nose to tail, 54 inches, but a foot less would probably give the dimensions of the recent animal, as the skin is evidently much stretched; height of the back 32 inches, from which also about 2 inches might be deducted; from muzzle to base of horn 8 inches, and ears $3\frac{1}{2}$ inches. The horns measure 20 inches over the uppermost ridge, and 10 round at base, having their tips 25 inches apart; but those of a specimen noticed in the Bengal Sporting Magazine, (for 1839, p. 295,) were $25\frac{1}{2}$ inches long, with a girth of $11\frac{1}{2}$ inches; and a horn of this same species, which I examined at Mr. Leadbeater's, had attained a length of 2 feet, and circumference of 11 inches at base, having a span of 14 inches from base to tip inside, and numbering at least ten indications of annual growth, and probably at least one more towards the tip, which could not be made out with certainty. The respective lengths of these were successively $10\frac{1}{2}$, $21\frac{1}{2}$, $2\frac{1}{4}$, $1\frac{3}{4}$, $1\frac{3}{4}$, $1\frac{1}{2}$, 1, 1, $\frac{3}{4}$, and the basal $\frac{1}{2}$ inches. The coat of the Burrhel Sheep is rather long, and harsher than that of the Nahoor, having less wool concealed beneath it than in the Moufflon and Rocky Mountain species. The female is undescribed, and I have met with no other specimens than are here mentioned.

In the description of the preceding species, the principal differences are stated which distinguish the horns of that animal from those of the present one. The Burrhel's horns have all the ridges rounded off, though still sufficiently distinct, and the marks of annual growth are deeply indented, the horn bulging a little between them. Upon a front view the backward curvature of the tips disappears altogether, and the animal has an imposing appearance, finer than that of the Nahoor. Its colour is much darker than the summer dress of the Moufflon Sheep.

The Burrhel would seem to inhabit a much loftier region of the Himalaya than the Nahoor, where it bounds lightly over the encrusted snow, at an altitude where its human pursuers find it difficult to breathe. It has the bleat of the domestic species, as indeed they all have, and is very shy and difficult of approach. Flocks of from ten to twenty have been observed, conducted by an old male, which make for the snowy peaks upon alarm, while their leader scrambles up some crag to reconnoitre, and if shot at and missed, bounds off a few paces fur-

ther, and again stops to gaze. They pasture in the deep hollows and grassy glens. The Society's specimen was met with near the Boorendo Pass, at an altitude estimated to have been from 15,000 to 17,000 feet. The notice in the 'Bengal Sporting Magazine' refers to the same locality; and another notice most probably alludes to this species, in Lieut. Hutton's 'Journal' of a Trip through Kunawar,' published in the 'Journal of the Bengal Asiatic Society' for 1839, p. 994.* Finally, Mr. Leadbeater informed me, that the horn described as having been in his possession was brought from Nepál, together with specimens of the Nahoor and Musk, and the skull and horns of a Himalayan Ibex, which I also examined.

8. *O. Cylindricornis*, nobis, (the Caucasian Argali.)—Colonel Hamilton Smith notices this animal in his description of *O. Ammon*, (published in Griffith's English edition of the "*Regne Animal*," vol. iv. p. 317,) and writes me word, that an individual died on landing it at Toulon, whither it had been brought by a French Consul, who did not preserve the skull or skin, but set up the horns, which were quite fresh when he saw them. "Each horn was about 3 feet long, arcuated, round, as thick at the top as at the base, of a brown colour, nearly smooth, and about 15 inches in circumference. They were so heavy and unmanageable," writes Colonel Smith, "that I could not lift both together from the ground, nor place them in that kind of juxtaposition, which would have given me an idea of their appearance on the head. I could not well determine which was the right, or which the left horn. Circumstances prevented my taking a second view of them, as they arrived only the day before I left Paris, and they are now doubtless in the Musuem of that capital." In my former paper I alluded to this animal as probably distinct, and apparently allied to the Burrhel: the foregoing details confirm me in that opinion, and remove all doubt of its distinctness, as there is no other species to which they will at all apply. The sketch

* More recently, I perceive that Lieut. Hutton has identified the animal here referred to with *O. Nahoor* (vide 'Journal,' 1840, p. 568), but it is probable that both species are found there, and they cannot well be confounded after the description which I have given of *O. Burrhel*. Of the *Ovis Ammon*, Lieut. Hutton observes, "I could learn nothing, save that an animal apparently answering to the description is found in Chinese Tartary, and I saw an enormous pair of the horns nailed, among other kinds, to a tree as an offering to Devi." These, however, may have belonged to *O. Poliü*.—E. B.

which Colonel Smith has favoured me with, represents a Sheep horn, apparently of the same general form as those of the Burrhel and Nahoor; but the dimensions specified are very superior to those attained in the instance of either of the two Himalayan species adverted to, and I can only suppose that the (reverted?) tips had been broken off, and the truncated extremity worn smooth. The wild Sheep of Caucasus and Taurus are at present little known, nor does any notice of this genus occur in the catalogue of Caucasian animals, published by M. Ménétries; though it is nevertheless certain, from the vague incidental notices of various travellers, that some, and not unlikely several, exist. At Azaz, by the foot of Taurus, Mr. Ainsworth mentions having seen an animal, which he designates *Ovis Ammon*, (vide *Travels in Assyria, Babylonia, and Chaldea*, p. 42.)*

9. *O. Gmelini*, nobis, (the Armenian Sheep.)—This species belongs to the Moufflon group, but is yet very different from the Moufflon Sheep of Corsica. It is described and rudely figured in the *Reise durch Russland* (vol. iii. p. 486, and Tab. LV.,) of the younger Gmelin; and the skull and horns, forwarded by that naturalist to St. Petersburg, have been figured and described by Pallas in his *Spicilegia* (Fasc. xii. p. 15, and Tab. V. fig. 1.) Messrs. Brandt and Ratzeburg erroneously identified it, at the suggestion of M. Lichtenstein, with the wild Cyprian species, the horns of which have a nearly similar flexure. Fine specimens of the male, female, and young, lately received by this Society from Erzeroom, enable me to give the following description:—

Size of an ordinary tame Sheep, with a remarkably short coat,† of a lively chestnut-fulvous colour, deepest upon the back; the limbs and under-parts whitish, with few traces of dark markings, except a finely contrasting black line of more lengthened hair down the front of the neck of the male only, widening to a large patch on the breast; and in both sexes a strip of somewhat lengthened mixed black and white hairs above the mid-joint of the fore-limbs anteriorly, which cor-

* Very probably, however, this notice refers to the next species, *O. Gmelini*; as may, also, that of Captain Mignan, who mentions seeing “flocks of mountain Sheep, the Chamois, and wild Goats,” at the foot of the Aligèze range. Vide ‘*Winter Journey to Koordistan*,’ vol. i. p. 195.—E. B.

† Evidently the summer garb of the species.—E. B.

responds to the tuft of *O. Tragelaphus* ; tail small, and very slender : horns of the male subtrigonal, compressed, and very deep, with strongly marked angles and cross striæ, diverging backwards, with but a slight arcuation to near the tips, which incline inwards. As regards the flexure alone, but not the character of the horn, which is allied to that of the common Ram, this handsome species links the Moufflon group with the Nahoor and Burrhel group.

Length nearly 5 feet from nose to tail ; the tail 4 inches : from nose to base of horn 8 inches ; and ears $3\frac{1}{2}$ inches. Horns (about full grown, or nearly so,) 20 inches over the curvature, 10 round at base, 4 deep at base inside, their widest portion 2 feet apart, and tips 21 inches, with a span of $13\frac{1}{2}$ inches from base to tip inside ; their colour pale. Around the eye and muzzle this species is whitish ; the chaffron and front of the limbs are more or less tinged with dusky, and its coat is rather harsh, and fades considerably in brightness before it is shed. Female generally similar, but smaller, with no black down the front of the neck, and in the observed instances hornless. The lengthened black hair of the male is only 1 inch long, and that composing the tuft on the fore-limbs is so disposed that the latter is white in the centre, flanked with blackish.

According to M. Gmelin, this species is found only on the highest mountains of Persia. Its rutting season takes place in September, and lasts a month ; and the female yeans in March, producing two or three lambs at a time : the males, he informs us, are very quarrelsome amongst each other ; insomuch that he had been at one place where the ground was completely strewed with horns that had been knocked off in their contests ; so that if any variation in the flexure of these horns had been observable, this industrious naturalist would doubtless have remarked it. Sir John McNeill informed me, that "it appears to be the common species of the mountains of Armenia ; occurring likewise on the north-west of Persia : " but the wild Sheep of the central parts of Persia is evidently distinct,* "having horns much more resembling those of the domestic Ram, being spiral, and completing more than one spiral circle—I think I am not mistaken in supposing," continues Sir John, "that I

* As also that of the eastern districts, which appears to be *O. Vignei*.—E. B.

have also had females of this species brought to me by the hunters, with small horns, resembling those of the ewes of some of our domestic Sheep; but, on reflection, I find that I cannot assert this positively, though I retain the general impression." It is highly probable, that a wild type of *O. Aries* is here adverted to, which would thus inhabit the same ranges of mountains as the wild common Goat, (*C. Ægagrus*): and with respect to the circumstance of horns in the female sex, I may here remark, that this character is very apt to be inconstant throughout the present group. It has already been noticed in the instance of *O. Nahoor*; and the elder Gmelin states that the females of *O. Ammon* are sometimes hornless, while those of the Corsican *O. Musimon* are generally so. The same likewise happens in different species of wild Goats, in the Goral of India, and in the prong-horned animal of North America; and even in the Gazelles, and other bovine-nosed species of what are commonly confused together under the name of Antelope, there have been instances of hornless males as well as females. A male Spring-bok of this description, as I am informed by Colonel Hamilton Smith, was long in the possession of the Empress Josephine; and the specimen of *Ixalus Probaton*, Ogilby, in the Museum of this Society doubtless affords another example of the same phenomenon.

10. *O. Vignei*, nobis: the *Shá* (not *Sná*) of Little Tibet, and *Koch* of the Sulimani range between India and Afghanistan.*—This fine species is closely allied to the Corsican Moufflon, but is much larger, with proportionally longer limbs, and a conspicuous fringe of lengthened blackish hair down the front of the neck, and not lying close, as in the Moufflon.† Its size, as I am informed by Mr. Vigne, is that of a large Fallow Deer, and "from the general appearance of these animals, their length of leg, and swiftness on the mountains, they reminded me," remarks that gentleman, "of Deer, rather than Sheep."

* Also the *Kutchgar* of Pamir, described by Lieut. Wood, and *Kooshgar* or *Kooch-i-Koh* of Sir Alexander Burnes; *Ovis cycloceros*, Hutton, ('Calcutta Journal of Natural History, No. IV. p. 557.')

—E. B.

† At least as in the Mufflon in summer dress, for in winter it also hangs loosely in this animal. I believe now, however, that the summer and winter coats of both species will be found to correspond in this particular.—E. B.

The general colour of this animal, to judge from an elaborately finished painting, taken from a living individual in its native country by Mr. Vigne, to whom we are indebted for all we know concerning the species, is a rufous brown, apparently not so deep as in the Moufflon; the face livid, or devoid of the rufous tinge of the body, and not terminated by a white muzzle, as in the Moufflon Sheep: the belly is white, separated by a black lateral band; and the limbs are brown, not mottled, as in the Moufflon, but with a whitish ring immediately above each hoof, then a dark ring, and above this a little white posteriorly, as in the Neelgai. The fringe in front of the neck is doubtless peculiar to the male, and the hairs of it would appear to be 4 or 5 inches long, and hang loosely. Tail about 6 inches long, and slender, apparently resembling that of the Armenian species rather than the Moufflon's.*

* This species has been described as the "Wild Sheep of the Paropamisian range," by Captain Hay, (in the 'Journal,' for 1840, p. 440,) and I have no doubt of the correctness of this identification, though certain discrepancies are deserving of being noticed. Capt. Hay states the muzzle to be white (as in the Corsican Moufflon); the legs, too, to be "covered with white, smooth, short hair; belly white; tail small, short, and together with the buttocks white. The general colour" he says, "is pale rufous inclining to grey, and fading off to white beneath. A large beard from the cheeks and under-jaw, divided into two lobes, which are white, and connected to a streak of long black flowing hair reaching to the chest. The adult male stands 3 feet 4 inches at shoulder: from nose to tail 5 feet 4 inches; head 1 foot; neck ponderous, 14 inches long, and 24 in circumference; girth of body, behind shoulders, 4 feet. The female is inferior in size, and not so much of a rufous colour; having small horns about 6 inches in length, which incline backwards and outwards. Those of the male are 2½ feet in length, and 12 inches round at base," &c. "The lambs are the colour of the female, have a dark stripe down the back, and in front of the fore-legs. They are produced in May and June."

Drawings of both sexes of this same species, transmitted by the late unfortunate Sir Alexander Burnes, are also before me, and present a somewhat different coloration from either of the above. The male is stated to have measured "4½ feet [5½ feet ?] in extreme length, from nose to tail-tip, and 3 feet 5 inches high, from the sole of the foot to the shoulders; female 3 feet 10 inches long, and 2 feet high." Both are evidently represented in summer dress, of an uniform light bay colour (including the limbs and tail), rather more vivid in the male, and merely fainter on the under-parts; there is no trace of lateral band; the face of the male only is coloured more livid, and with no white muzzle in either sex; nor is there any mottling near the hoofs (as in Mr. Vigne's drawing), but a slightly dark shade in front of the limbs of the male only, which, it may be, is intended merely for shadow. The lobes of hair pendent from the sides of the lower jaw are whitish, and the fringe down the front of the neck is coloured dusky-black, being not very long, and projecting so as to form an obtuse point or angle opposite the lower part of the neck, exactly as in the Moufflon of Corsica. The female has not

A full grown pair of horns measure $32\frac{1}{2}$ inches over the curvature, and 11 inches round at base ; their widest portion apart, measured outside, is 2 feet, the tips converging to 8 inches, and span from base to tip also 8 inches : they are subtriangular, much compressed laterally, the anterior surface $2\frac{3}{4}$ inches broad at base, with its side-angles about equally developed, and the posterior part of the section tapers rather suddenly to a somewhat acute angle ; eight years of growth are very perceptible, which successively give 12, 7, 4, 3, 3, $1\frac{1}{2}$, $1\frac{1}{2}$, and $\frac{1}{2}$ inches ; they bear considerable resemblance to those of the Moufflon Sheep, but differ in being very much larger, and in the circumstance of the outer front-angle being as much developed as the inner one, and they have not the slightest tendency to spire, but describing three-fourths of a circle, and originally diverging as in a common Ram, they point towards the back of the neck, somewhat as in *O. Tragelaphus*. Another and younger specimen, however, has a decided spiral flexure outward, more especially towards the tip, and has also the outer angle much less developed than in the corresponding terminal portion of the former. This pair had grown to 11 inches long, with the tips $14\frac{1}{2}$ inches apart ; only one year's growth, and that apparently incomplete, is however exhibited, and the curvature is likewise less than in the older specimen. The portion of skull attached is also so much smaller, that I think it prudent to hesitate in identifying it as specifically the same. The posterior margins of the orbits are but $4\frac{1}{2}$ inches apart, whereas in the other they are $5\frac{1}{2}$ inches. There are no materials for extending the comparison, but a few more dimensions may be given of the smaller one. The greatest width of this skull at the posterior portion of the zygomæ is 5 inches, and the orbits are $3\frac{1}{4}$ inches distant where most approximated : the series of 5 developed molars occupied $2\frac{3}{4}$ inches ; width of second true molars apart, posteriorly and externally, $2\frac{1}{4}$ inches ; of anterior false molars, measured outside and before, $1\frac{1}{8}$ inch ;

any trace of this lengthened hair, and is represented with very short horns, indicating that the individual was probably young.

Mr. Vigne's coloured portrait represents a much younger male than that figured by Sir Alexander Burnes, and I should say in winter vesture : the same gentleman had also a coloured figure upon a large scale of the head of a still younger specimen, which was coloured similarly to the other, or of a livid hue, without any white muzzle. I possess copies of both figures.—E. B.

greatest width of palate, $1\frac{3}{4}$ inch, and from front or first false molar to anterior portion of occipital foramen, $5\frac{3}{4}$ inches. Mr. Vigne, indeed, assures me, that the adult has only five grinders on each side of both jaws, as in the Chirew, which, if normal, would make an important distinction, as the smaller specimen would undoubtedly have developed a third true molar, and possesses three false ones; whereas it is in one of the latter that the Chirew is deficient. I am inclined, however, to regard the two specimens as belonging to the same species, since I have observed analogous differences in the mere flexure of the horn in different Corsican Moufflons; but it was at all events proper to indicate the disparity.*

Vast numbers of this species," relates Mr. Vigne, "are driven down by the snow in winter to the branches of the Indus, near Astor, at the southern extremity of Little Tibet, where the river breaks through the chain of the Himalaya. I once saw a young one, apparently of this species, in Persia, but took no memorandum of it at the time; it was dirty and draggled, but, I think, was covered with short wool." I have great pleasure in dedicating this species to that gentleman.†

* Five skulls, with the horns, of adult males, are now before me, together with some loose horns, which enable me to decide that the above animals were the same in species; it is very rarely, however, that the outer front-angle of the horn does not quite equal the inner one; the extreme length of skull, from vertex to tip of intermaxillaries, is $8\frac{1}{2}$ inches, and greatest breadth $5\frac{1}{2}$ inches; length of bony palate $4\frac{1}{2}$ inches. The series of molars consists, as usual, of three true and as many false molars.—E. B.

† The *Ovis Vignei* is extensively diffused upon the various ramifications of the Hindoo Koosh, inhabiting Pamir on the north-east, the Sulimani chain of mountains on the south, and westward the ranges of the Elhoorz, which skirt the southern extremity of the Caspian Sea. At least I judge this to be the species mentioned in Mr. Fraser's 'Winter Journey from Constantinople to Tehran,' (vol. i. pp. 153, 155, and 159.) as being very numerous upon a mountain near Shahrood. This traveller notices, "The wild mountain Sheep and Goats. The male of the former is a noble animal, with a curly neck, and mane that would become a Lion [winter coat?], and prodigious curling horns; the latter [probably *C. Ægagrus*] has immense horns curving backwards. These mountain Sheep and Goats, warned by their sense of smell, were making off from our vicinity, at more or less speed, to places where they might be secure; there they would stand still upon some point or slab of rock, resembling it so nearly in colour as scarcely to be distinguishable without a glass." Again, further to the eastward, "a noble mountain Sheep" is mentioned (at p. 399); and "The wild Sheep and the wild Goat" are stated by the Hon. Mount Stuart Elphinstone to be common on the eastern hills of Afghanistan.

In the latter country, Capt. Thos. Hutton has more recently observed the *O. Vignei*, and supposing it undescribed, proposes for it the provisional name *O.*

11. *O. Musimon*, Linnæus.—The Moufflon Sheep of Corsica and Sardinia, but not, there is reason to suspect, of the Levantine countries. It is unnecessary to give a detailed description of this beautiful little species, though I may mention that the fine living male in the gardens measures 39 inches from nose to tail; the tail 5 inches; from nose to base of horn 7 inches; ears 4 inches; neck, from posterior base of horn to the abrupt angle of its insertion, 8 inches, and thence to base of tail 21 inches; height at the shoulder $2\frac{1}{4}$ feet. The horns of this individual are remarkable for not spiring in the least degree, whence they point towards the back of the neck: they measure 21 inches over their curvature, and $8\frac{1}{4}$ inches round at base, being in their fifth year of growth; their widest portion apart is 15 inches, and at the tips 6 inches; but another pair, upon the stuffed specimen in the Museum,

cycloceros, “from the circular position of its horns.” (*Extract from a letter dated Candahar, 12th September, 1840*, published in the *Calcutta Journal of Natural History*, No. iv. p. 557.) This gentleman thinks it will prove to be the proper “Bearded Sheep” of Pennant, and there is little or no doubt he is right so far as regards the imperfect skin purchased by Pennant in Holland, and which that naturalist was informed “came from the East Indies;” but Pennant erroneously identified this skin to be of the same species as the Barbary animal, (*O. Tragelaphus*,) and mixes up the two in his description. The figure he refers to, also, as taken from the living animal in Paris, and of which a copy is given by Shaw, (if I mistake not, a little embellished about the cheeks and chin,) appears to me to represent a Corsican Moufflon, (*O. Musimon*,) the hoofs of which had grown out of a state of protracted confinement, as commonly enough happens with captive ruminants.

Compare Mr. Fraser’s notice with that of Lieut. Wood, of a specimen of the “*Kutchgar*” of Pamir: this author states, “It was a noble animal, standing as high as a two year’s old colt, with a venerable head, and two splendid curling horns, which, with the head, were so heavy, as to require considerable exertion to lift them. Though in poor condition, the carcass, divested of its offal, was a load for a baggage pony; its flesh was tough and ill-tasted, but we were told that in autumn, when this animal is in prime condition, no venison is better flavoured. The *Kutchgar* is gregarious, congregating in herds of several hundreds. They are of a dun colour, the skin more resembling the hide of a cow than the fleece of a [tame] Sheep. A skeleton of this animal, and several complete crania, were deposited, I believe, at Loodiana.” The latter are now before me, or (as in a note to Taylor’s reprint of this memoir,) I should have been tempted to refer the foregoing notice to *O. Polii*. Whereas the carcass of *O. Vignei*, however, “divested of its offal, is a load for a baggage pony,” Sir Alexander Burnes was informed, respecting the “*Rasse*,” that “a common sized specimen will require two horses to bear its flesh from the field,” and the latter is moreover reported to be of a white colour. Capt. Hay remarks, that the present species is “gregarious in flocks of about forty, headed by an old male.” A stuffed specimen, I am told, exists in the Museum of Paris.—E. B.

which shew the more usual [?] slight spirature are 26 inches long, having their widest portion 14 inches apart, and the tips as much as 12 inches: this pair shews seven years of growth, and their development was evidently completed, though they are only 7 inches in girth at base. The female has seldom any horns, which, when they exist, are ordinarily about 2 inches long.

The character of the horn of the Moufflon is nearly the same as that of the domestic Ram, only that it is never so much prolonged, nor indeed to more than two-thirds of a circle: the inner front edge is acute to near the base, where the outer one approaches to an equality with it; the first half being thus unequally triangular, and the remainder much compressed, with strongly marked rugæ, and having the inner surface of the horn concave. It has always appeared to me, however, that the specifical distinctness of the Moufflon is very obvious, and I doubt whether it has contributed at all to the origin of any tame race. That it interbreeds freely with the latter, under circumstances of restraint, is well known; but we have no information of hybrids, or *Umbri*, as they are called, being ever raised from wild Moufflons, though the flocks of the latter will occasionally graze in the same pasture with domestic Sheep, and all but mingle among them. The male of this animal is denominated in Corsica *Mufro*, and the female *Mufra*, from which Buffon, as is well known, formed the word 'Moufflon;' and in Sardinia the male is called *Murvoni*, and the female *Murva*, though it is not unusual to hear the peasants style both indiscriminately *Mufion*, which, (as Mr. Smyth remarks in his description of that island,) is a palpable corruption of the Greek *Ophion*. It is sometimes stated, but I do not know upon what authority, that a few of these animals are still found upon the mountains of Murcia.*

* I am not aware that the winter dress of the Moufflon has ever been described. In summer the coat presents a smooth surface, with the hair in front of the neck but moderately elongated, and lying close, though projecting so as to produce an obtuse angular outline opposite the lower part of the neck, where it is longest. The general colour is bright rufous brown, with a triangular white saddle-like mark on each side; the head is dusky, with a white muzzle, and darker chaffron; the belly and limbs below the mid-joint are also white, with generally dark markings in front of the latter, more or less developed; and there is a conspicuous white disk surrounding the tail, but not ascending above it (as in the Argali;) the lengthened hair in front of the neck is black, as also a lateral band bordering the white belly, together with the outside and inside of the upper half of the fourlimbs, the tail, and

12. The *Cyprian Moufflon*, figured and described by Messrs. Brandt and Ratzeburg from a specimen in the Berlin Museum, and contrasted by them with M. F. Cuvier's figure of the Corsican animal, is probably a distinct species, intermediate to *O. Musimon* and *O. Gmelini*; its

a median line over the forequarters terminating at the white saddle: the female is much less rufous, with the dark markings less developed, and no white patch on the sides.

In winter, there is a considerable admixture of black about the body; the hair upon the nape, and especially the withers, is much elongated, forming a very conspicuous mane when it does not fall over on one side; that on the under or forepart of the neck is also of considerable length, and projects forward in a peculiar manner, being directed upward from the chest, and downward from the upper portion of the fore-neck; but the most remarkable feature consists in what in summer merely forms the triangular white patch on the sides, which is then even with the rest of the coat, whereas in winter dress this forms a whorl of very much lengthened white hair protruding far beyond the rest, and imparting a singular appearance to the animal when viewed otherwise than laterally. I have observed the same character in a woolly domestic Sheep, which was brought from one of the West Indian islands, in which case the whorl of white hair projected beyond the rufous wool.

The Moufflon is a very brisk, energetic animal, rather powerfully made, and strong about the neck, but appearing more so from the length of the hair in front of that part, which in winter may be termed shaggy; the wool beneath its hair is much more copious than in the wild Sheep generally. Its pace is a fleet canter, all lightness and agility; but (as Azuni remarks) it is soon fatigued when pursued over level ground, though from their nimbleness they can seldom be approached in their native wilds. There they bound with surprising vigour, "jumping from rock to rock at the distance of many feet, and if hard chased to the extremity of a cliff from whence it can reach no other, it will throw itself over, and with astonishing agility pitch upon its horns, without receiving any hurt."—(Boswell's Corsica, p. 41.) The same is stated of *O. Tragelaphus* in Jackson's 'Account of the Empire of Morocco.' This animal inhabits the wilds of Corsica and Sardinia, and never quits the highest ridges, where the temperature however does not allow of permanent snow. In general they live in small herds, headed by an old male, but unite occasionally into flocks of a hundred or more, which separate again when the rutting season commences, and the usual battles have decided how many females each male can retain. The females yearn two lambs in April and May. When brought up tame, the adult male is a capricious and violent little animal, ever ready to butt at strangers the moment their back is turned, or they look for an instant in another direction. I have seen one run at and butt against a post again and again, merely for amusement; and when grazing, it often rubs the herbage violently with its horns, which it makes full use of on all occasions. It is active, curious, impudent, and lascivious, perfectly fearless, and propagates readily with the domestic Sheep, though only under circumstances of restraint, (as noticed in the text.) Azuni and other authors notice their flesh to be equal to the finest mutton; and the mountaineers are said still to convert their skins into vests, and a kind of cloak, which, it has been remarked, may be the present representatives of the *Mastruca Surdorum*, noticed in the commentaries on Cicero, as made from the skin of the Moufflon. This dress was worn in particular by the inland robbers, the *Mastruca latrunculæ*.—E. B.

horns have more the curvature of those of the latter species, but are not so robust, and curve round gradually backward from the base, instead of at first diverging straightly, as in *O. Gmelini*; but the colour of the coat would appear to resemble that of the Corsican Moufflon, only without the rufous cast, and the specimen figured wants also the saddle-like triangular white patch, which I suspect is never absent in the Moufflon of Sardinia and Corsica. The *Tragelaphus* of Belon, it is true, observed by that author in Candia and in Turkey, is described by him to have "horns similar to those of Goats, but sometimes gyrted like those of a Ram;" yet the fact of a nearly similar flexure of horn to that represented by Messrs. Brandt and Ratzeburg proving to be of normal occurrence in the allied Armenian wild Sheep, confers additional probability on the supposition that the Berlin specimen of the Cyprian Moufflon has also normally curved horns, which alone would go far to establish its claim to rank as a species, in which case it might bear the appellation of *O. Ophion*.*

13. *O.*—*Ixalus Probaton*, Ogilby.—I stated in my former paper an opinion, to which I am still disposed to adhere, that this animal is no other than a genuine Sheep, but specifically distinct from any at present known: the specimen had long lived in captivity, as is obvious from the manner in which its hoofs had grown out; but whereas I formerly sought to account for its absence of horns, by ascribing this to probable castration at an early age, I am now inclined to consider that this abnormality, for such there is every reason to suppose it, was individually congenital, as in other rare cases before alluded to. The Armenian wild Sheep approaches more nearly to this species than any other as yet discovered; so much so, that before actually comparing them, I thought that they would prove to be the same; but they are nevertheless distinct, as is particularly shewn by the longer and less

* It is worthy of notice that the Cyprian animal bears about the same relation-ship to the Corsican Moufflon, which *O. Gmelini* does to *O. Vignei*. It is therefore, also, probably distinct. In an original description of the island of Milo, published in the Penny Magazine, (No. 135,) we read that, on Mount St. Elias, "still higher up, the surface was broken into fine bold crags, among which we were told that, as in Candia, and one or two of the larger islands of the Archipelago, the Moufflon is still to be found. We, however, certainly saw nothing of the sort; and on en-quiring afterwards of some of the old inhabitants, we did not receive *very* satisfactory assurances that they had ever seen any."—E. B.

slender tail of the present animal, and the very different texture of its coat ; the absence of dark markings on its face and limbs may prove to be an individual peculiarity. The specimen is of the size of a large tame Sheep, and entirely of a chestnut-fulvous colour, dull white beneath and within the limbs, also on the lips, chin, lower part of the cheeks, and at the tip of the tail. From nose to base of tail it measures about fifty inches, the tail half a foot, and height of the back two feet and a half. From nose to rudiment of horn nine inches, and ears four inches : the vestiges of horns, which exactly resemble those found upon many breeds of tame Sheep, are two inches apart. Upon the minutest examination of the specimen, I can perceive no character whatever to separate it from the genuine Sheep, nor any distinction more remarkable than the trivial circumstance of its chaffron not being bombed, as usual, which however is equally the case with *O. Tragelaphus*. I have been favoured, however, by Colonel Hamilton Smith, with a drawing of an animal observed by himself on the banks of the Rio St. Juan in Venezuela, which appears to accord so nearly with *Ixalus Probaton*, except in the particular of bearing horns similar to those of the Rocky Mountain Goat, that its absolute identity is probable, in which case it would be curious that a species so very nearly allied to the genus *Ovis*, should yet differ from it so considerably in the character specified. The South American animal adverted to, is the *Aploceros Mazama* of Colonel Smith, and is probably congeneric with the *Pudu* of the Chilian Andes, mentioned by Molina, (the existence of which would appear to have been lately re-ascertained by M. Gay,) and also with the fossil *Antilope Maquiniensis* of Dr. Lund : there would indeed appear to be other living species of this type, more or less distinctly indicated by different authors.

14. *O. Aries*, Linnæus, the Domestic Sheep.—Assuming that different species have commingled to produce this animal, as appears to be very evident in the instance of the Dog, it is still remarkable that we have certainly not yet discovered the principal wild type, nor indeed any species with so long a tail as in many of the domestic breeds, which I cannot doubt existed also in their aboriginal progenitors : nothing analogous is observable among the endlessly diversified races of the Domestic Goat, which all appear to have been derived exclusively

from the Caucasian *C. Ægagrus*; and as in my former paper I suggested the probability that a wild Sheep more nearly resembling the domestic races than any hitherto discovered, would yet occur somewhere in the vicinity of the Caucasus, it now appears that such an animal does exist in Central Persia, as noticed in my description of *O. Gmelini*: nor should it be forgotten, that Hector Boetius mentions a wild breed in the island of St. Kilda, larger than the biggest Goat, with tail hanging to the ground, and horns longer and as bulky as those of an ox.* Pennant remarks upon this subject, that such an animal is figured on a bas-relief taken out of the wall of Antoninus, near Glasgow.

Of all the wild species of true *Ovis* that have been here described, the Rass of Pamîr approaches nearest to *O. Aries* in the character of its horns, though differing in one particular besides size, that has been pointed out, namely, that the two front angles are about equally developed, whereas in *O. Aries*, as in the Moufflon, the inner angle is more acute to near the base. Some experience in the deduction of the specific characters of Sheep horns enables me to state with confidence, that the character of the long-tailed domestic breeds of Europe, and also of most other breeds, is intermediate to that of the Rass and that of the Moufflon, combining the flexure and the prolongation of the former with the section of the latter, but becoming proportionally broader at the base than in either; more as in the Argalis of Siberia, Kamtschatka, and North America. That *O. Aries* is totally distinct from all, I have been long perfectly satisfied, and examination of the Rass in particular has strongly confirmed me in this opinion. I think it likely, however, that more than one wild species have commingled to form the numerous domestic races, though certainly not any that have been described in this paper. It is not very long since the question was habitually discussed, whether

* Two crania of Sheep, apparently male and female, from the Irish peat, in the possession of the Earl of Enniskillen, and exhibited sometime ago at a meeting of the Geological Society, are probably of this race.

Here I may mention, that among the numerous valuable fossil remains from the Sivalik deposits, presented to the Asiatic Society by Colonel Colvin, (as noticed in the Journal of the Society, vol. v. p. 183), I have determined a large fossil Sheep (allied to, if not identical with the Argali), a fossil Ibex, which I shall take an early opportunity of figuring and describing.—E. B.

the tame Sheep has descended from the Argali of Siberia, or the Moufflon of Corsica; and now that so many more indisputably distinct wild species have been added to the catalogue of this genus, it is probable that we are still far from having ascertained the complete existing number; but that several more yet remain to be discovered upon the lofty table-lands and snowy mountains of middle Asia, from the Caucasus and Taurus to the Altai, and among them, it is very probable, some much more nearly allied to the domestic races than any at present known.

The whole of the foregoing animals appertain to my subgeneric group *Ovis*, as distinguished from *Ammotragus*, which latter is characterized by the absence of suborbital sinuses, like the Goats, but differs from the latter by possessing interdigital fossæ, as in other Sheep. This difference between the Goats and Sheep appears to have been first noticed by Pallas, and has since been descanted upon by Professor Géné in vol. xxxvii. of the 'Memorie della Reale Accademia delle Scienze di Torino.' The fact of such a diversity in genera so nearly allied in habitat as the Goats and Sheep, renders the problem of the utility of the structure in question somewhat difficult of solution. The species upon which I found the subgenus *Ammotragus*, has decidedly an Ovine, rather than a Caprine, aspect, when viewed alive; the male emits no stench, as in the Goats; the bleat is precisely that of *Ovis*; and the animal butts like a Ram, and not like a Goat. Unlike the other species of admitted wild Sheep, as well as the long-horned or true wild Goats, it has a concave chaffron, and no markings on the face and limbs: its tail is rather long, which is the case in no species of *Capra*, and is also remarkable for being tufted at the extremity. The indigenous habitat, North Africa, is a further peculiarity in the genus in which it is here placed, though two species of wild Goats respectively inhabit Upper Egypt, and the snowy heights of Abyssinia.

15. *O. Tragelaphus*, Pallas, the African Goat-sheep.—This animal appears to vary considerably in size, some exceeding a Fallow Deer in stature, while others are much smaller. It has no beard on the chin, like the true Goats, but is remarkable for the quantity of long hanging hair in front of the neck, and on the upper part of the fore limbs, the former attaining in fine males to about a foot in length,

and the latter to nine inches; there is also some lengthened hair at the setting on of the head, and a dense nuchal mane, the hairs of which are three inches long, continued over the withers till lost about the middle of the back. General colour tawny, or yellow-brown; horns moderately stout, turning outwards, backwards, and so inwards, with the tips inclining towards each other.

The splendid male in the British Museum measures 5 feet from nose to tail, and tail 9 inches, or with its terminal tuft of hair 13 inches; height of the back $3\frac{1}{2}$ feet, but the living animal would not have stood so high by some inches; from muzzle to base of horn 11 inches, and ears 5 inches. The finest pair of horns which I have seen are in the same collection, and measure 25 inches over the curvature, $10\frac{1}{2}$ round at base, with an antero-posterior diameter of $2\frac{1}{2}$ inches inside; they diverge to 23 inches apart, measuring outside, at a distance of 6 inches from the tips, which latter return to 15 inches asunder; their span from base to tip inside is 13 inches: at base they are closely approximated, but not quite in contact. General form subquadrangular for nearly a foot, then gradually more compressed to the end, and having a very deep longitudinal furrow for the greater portion of their length outside, above which the horn bulges: there is a mark of annual growth at $1\frac{1}{4}$ inch from the base, another $1\frac{1}{2}$ inch further, and a third after an interval of 3 inches; but the rest are too indistinct to be made out with certainty among the wrinkles of the horn. A large pair of female horns were 16 inches long; $7\frac{1}{2}$ round at base; their widest portion apart, near the tips, 19 inches; and the tips $17\frac{1}{4}$ inches: their surface is marked with broad transverse indentations, which in the males ordinarily become more or less effaced with age. The female of this species is a third smaller than the other sex; and a lamb in the collection of this Society is extremely kid-like, with the spinal mane upon the neck and shoulders very conspicuous, but no lengthened hair on the fore-neck and limbs; in the half grown male, the latter especially is still not much developed.

This species is well known as the *Aoudad* of the Moors, and the *Kebsh* of the Egyptians; it is also, according to Rüppell, the *Tedal* of the inhabitants of Nubia, which is doubtless the same as *Teytal*, applied by Burckhardt to the Wild Goat of that region, in addition to the word *Beden*, which (in common with Rüppell and others) he also as-

signs to the latter. Sir Gardner Wilkinson, however, confirms Burckhardt by informing us, that the Goat referred to is called in Arabic *Beddan*, or *Teytal*, the former appellation referring to the male only. This author adds, that the present species "is found in the eastern desert, principally in the ranges of primitive mountains, which, commencing about lat. $28^{\circ} 40'$, extend thence into Ethiopia and Abyssinia." According to M. Rüppell, "it is found in all North Africa above 18° , in small families, and always upon the rocky hills;" frequenting the steepest and most inaccessible crags amid the woods and forests of the Atlas, and descending only to drink. It is a wonderfully agile leaper, even more so than the wild Sheep and Goats generally, and is remarkable for always browsing in preference to grazing. The *Ovis ornata*, figured by M. Geoffroy in the great French Work on Egypt, would appear to be merely a small sized individual.

The following may serve for definitions of the various ascertained species of Wild Sheep that have been here described:—

O. Polii, Blyth. *O. cornibus maximis triquetris, angustis altissimisque; angulis anterioribus equalibus: extrorsum spiraliter gyratis, et tam prolongatis quam sunt cornua Arietum domesticorum longissima: sulcis transversim indentatis; colore pallido.* Animal non cognotum est, sed *O. Ammoni* magnitudine saltem haud inferius. Habitat apud planitiem elavatam *Pamir* dictam, in Asia centrali.

2 *O. montana*, Desmarest.—*O. cornibus maximis triquetris, crassissimis, et sæpe inter angulos tumidis, ad apicem compressioribus; sulcis transversim indentatis; deorsum et antrorsum gyratis ad parallelum, apicibus extrorsum eductis; colore pallido, sed sæpe rufo-brunneo suffuso.* Animal ad magnitudinem *Cervi Elaphi* appropinquans, sed artubus brevioribus; pilis griseo-fulvis pallidis, maculis genericis super facie, pectore, artubusque fuscis; caudâ brevissimâ, et disco albescente circumdatâ. Habitat apud Americæ septentrionalis montes occidentalem versus.

3. *O. Ammon*, Pallas.—Diversitas hujus speciei ab præcedente non cognota est, quamvis patria differt, hæc in Siberiâ Orientali habitante; tertia alia species ambobus distincta regione intermediâ Kamtschatkæ invenitur, itidem simillima, tamen (apparenter) facillimè dignoscenda; viz.

4. *O. nivicola*, Eschscholtz.—*O. cornibus triquetris*, et inter cornua *Polii* et *Montanæ* Ovium apparenter intermediis; apicibus magis prolongatis quam in *O. montanæ*, sed ad basin crassioribus; potius quàm in *O. Polii* prolongatis, sed cornibus utriusque minoribus. Magnitudo hujus animalis inferior est, et pilorum color flavescens, sine disco caudali. Habitat apud montes Kamtschatkæ.

5. *O. Californiana*, Douglas.—*O. cornibus crassis triquetris*, ad apicem compressioribus; sulcis transversim indentatis; curvamine aperto extrorsum (non antrorsum) gyranibus, apicibus plurimum extrorsum ductis; colore pallido, aut rufo-brunneo paulum suffuso. Magnitudo Ammonis vel paulum inferior: caudâ elongatâ, et non (?) disco pallido circumdatâ. Habitat apud Californiam, et regionem proximam Americæ continentis.

6. *O. Nahoora*, Hodgson.—*O. cornibus crassis subcylindraceis*, suprâ magis planiusculis, culmine abruptiore medio, dimidio-distali compressiori, et extrorsum arcuatis, apicibus retortis: sulcis transversis obsoletis; colore pallido. Magnitudo Arietis grandis; pilis griseis, vel in junioribus adultis fulvo terminatis, maculis genericis fuscis; caudâ brevi et floccosâ. Habitat apud regiones medias montium Himalicorum, et in Tibeta Magnâ.

7. *O. Burrhel*, Blyth.—*O. cornibus crassis subcylindraceis*, supra convexioribus, culmine longitudinali minus abrupto, et aliis angulis minùs prominentioribus quàm in specie præcedente, subequalioribus; in arcu extrorsum curvatis, apicibus retrorsis; sulcis transversis obsoletis; colore nigrescenti-rubido. Magnitudo inferior est *Nahoori*, sed forma robustior; pilis castaneo-brunneis intensis; maculis genericis nigris et distinctis; caudâ minimâ (?) et non floccosâ. Habitat apud montium Himalicorum regiones summas.

8. *O. cylindricornis*, Blyth.—*O. cornibus maximis cylindraceis*, in arcu extrorsum (?) sine diminutione curvatis, apicibus non cognitis; sulcis transversis obsoletis: colore nigrescenti-rubido. Habitat apud Caucasum.

9. *O. Gmelini*, Blyth.—*O. cornibus triquetris* et robustis, altis, et transversim sulcatissimis; in arcu retrorsum divergentibus, apicibus introrsum ductis; colore pallido. Magnitudo Arietis; pilis brevissimis, et castaneo-fulvis splendidè coloratis; maculis genericis subdis-

tinctis, sed lineâ pilorum longiorum nigrâ infra collum in mare solo excipiendâ, apud pectore se expandente, et in utroque sexu cæsarie rudimentâ brachiis, sicut in *Ove Tragelapho* : caudâ brevi et gracillimâ. Habitat apud Armeniam, et provincias Occidentales Persiæ septentrionalis.

10. *O. Vignei*, Blyth.—*O. Musimoni* simillima, sed magnitudine *Cervi Damæ* grandis æquans, artubusque longissimis: cornibus robustis, compressis, et subtriquetris, angulis anterioribus equalibus; lunatim non spiraliter gyratis; et sulcis transversim indentatis: colore pallido. Corporis pilis rufo-brunneis; facie artubusque lividis; ventre, et annulis supra ungulas albis; lineâ laterali nigrâ, pedibus annulo secundo nigro anticè albo super marginato notatis; apice caudæ (brevis et gracilis,) et lineâ pilorum paulum pendentium infra collum medium ad pectus tendente, nigris. Habitat apud Asiam centralem—Varietas cornibus extrorsum gyratis, cum angulo interiori prominentiori.

11. *O. Musimon*, Linnæus.—*O.* cornibus compressis, ad basin triquetrioribus, angulo interiori prominentiori; lunatim gyratis, et sulcis transversim indentatis: colore pallido. Magnitudo Arietis parvi, caudâ brevi et magis villosâ: pilis rufo-brunneis; facie lividâ cum capistro, ventre, clunibus, dimidiisque artum inferioribus, albis; et lineâ laterali, caudâ, pectore, et membrorum plerumque dimidiis superioribus, nigris: maculâ triangulari alba utroque lumbo conspicuâ. Habitat apud insulas Corsicæ et Sardiniae, et forsan provinciam Murciæ in Hispaniâ.

12. *O. Ophion*, Blyth.—*O. Musimoni* simillima, sed cornibus retrosis, apicibus accurvatis: pilisque brunneis, et non rufescentibus(?) Habitat apud Cyprum, et forsan regiones alias Levantinas.

13. *O. Aries*, Linnæus.

14. *O*—? *Ixalus Probaton*, Ogilby.—Magnitudo Arietum maximorum, caudâ paulum elongatâ, cornibus in specimine solo cognoto abnormaliter (?) rudimentalibus, pilis castaneo-fulvis, et infra albescentibus.

15. *O. (Ammotragus) Tragelaphus*.—*O.* cornibus magnis subquadrangularibus, moderatè crassis, ad apicem compressioribus, sulcis transversim indentatis; divergentibus et retrorsum curvatis, sed prope basin rectis, apicibus acclinatis; colore pallido. Magnitudo *Cervi Damæ* superior, pilis flavescenti-brunneis; collo jubato, et infra

cum pectore brachiisque capillato, caudâ elongatâ extremitate villosâ; facie non convexâ—ut in omnibus speciebus aliis, sinibusque suborbitalibus nullis. Fæminâ semper (?) cornutâ, cornibusque fortioribus quàm in fæminis specierum hujus generis cæterarum, quæ sæpe non cornutæ sunt, sed plurimæ cornua parva, tenuissima, et compressiora ferunt, quæ in maribus junioribus aut curvata sunt, aut sæpe rectiora. Habitat apud Africæ septentrionalis montes rupestres.

A connected view of the species of Lichens, with their Botanical relationship existing between them and the Indian productions. By
HENRY COPE, ESQ.

HENRY TORRENS, ESQ.

Secy. Asiatic Society.

DEAR SIR,

As many of the Lichens which are indigenous to the Himalayan range, are closely allied by generic or (less proximate) family characters to the different species which have been used in Europe in the arts, or as articles of food for men or animals, it may perhaps be useful to present to the Society and those of its Members, who are interested in the subject, a connected view of those species, as the Botanical relationship which exists between them and the Indian productions, may lead to further investigation. I am indebted to Sir W. J. Hooker's sequel to the English Flora, for the chief portion of what I have now the honor to submit.

The Lichens of England, which with those of Europe generally, have even a closer affinity as regard their Botanical characters with those of the Himalayas, than the more conspicuous portions of vegetable productions, are divided by Hooker into seventeen families, comprising thirty-nine genera, of which eleven are distributed through seven families, exhibit species useful to man or beast; and it is an interesting fact that of these eleven, five belong to our family, the *Umbilicariæ*, and that to this same family appertain the species most frequently found in the Himalayas.

As, however, Dr. Hooker's notes will be more interesting than any observations of mine, I shall proceed at once to extract them, commencing with

Variolaria faginea, Pers.

The intensely bitter taste of this Lichen, according to Messrs. Turner and Borns, distinguishes it from every species hitherto discovered. It is upon this circumstance, which we have never found to vary, that we have been induced to place our chief reliance in making *V. faginea* and *discoidea* distinct. Mons. Braconnot detected in this and several other crustaceous Lichens, oxalic acid; in the present plant in such abundance, that 100 parts yielded 18 of lime, combined with 29.4 of oxalic acid, nearly the same quantity in other crustaceous Lichens, and he remarks, that oxalate of lime bears the same relation to the *Cryptogamia*, as carbonate of lime to corals, and phosphate of lime to the bony structure of the more perfect animals. It diminishes, however, in the family of Lichens in proportion as the species lose their general crustaceous texture, and approach more and more to the membranous or cartilaginous, although the latter also contain a considerable portion of salt. M. Braconnot strongly recommends the adoption of *V. faginea* in the production of oxalic acid, and an eminent French chemist now informs me, that it is so employed in France, and upon a very extensive scale.—*English Flora*, vol. v. p. 169.

Note.—Dr. Royle notices numerous species of crustaceous Lichens as indigenous to India generally, and as found both on rocks and trees; they belong to the genera *Lecanora*, *Lecideæ*, *Lepraria*, *Verrucaria*, &c.—*Illustrations* vol. i. p. 437.

Lecanora Parella, Ach.

This is the Parelle of Auvergne and other parts, where it is extensively employed to produce a dye far superior to that of the Cudbear, and quite equal to that of the Archil.—*English Flora*, vol. v. p. 191.

Note.—The Parelle which grows chiefly on basaltic rocks, is inferior to *Roccella tinctoria*, (Archil,) in not bearing ebullition, and has the disadvantage of not answering with alum, which destroys the colour.—*Ure's Dictionary of Arts*, p. 52.

Lecanora tartarea, Ach.

This is the famous Cudbear, (so called after a Mr. Cuthbert, who first brought it into use,) employed to produce a purple for dyeing woollen yarn, and nowhere perhaps used to so great an extent as in the manufactory of Mr. MacIntosh of Glasgow. This gentleman imports it largely from Norway, where it grows more abundantly than with us; yet in the Highland districts, many an industrious peasant gets a living by scraping off this Lichen with an iron hook and sending it to the Glasgow market. When I was in the neighbourhood of Fort Augustus some years ago, I was

informed, that a person could earn 14s. per week at this work, selling the material at 3s. 4d. the stone of 22lbs. The fructified specimens are reckoned the best.

A remarkable and fructified state of this plant, as it appears to me, is imported by Mr. MacIntosh from Sicily, with the crust singularly thick, and formed into warts so exceedingly elongated and cylindrical, that they appear like the podatia of an *Isidium*.—*English Flora*, vol. v. p. 191.

Note.—The *Lichen tartareus* dyes crimson red. In Jutland, *Cudbear* is made from it by grinding the dry Lichen, sifting it, then setting it to ferment in a close vessel with ammonia. The Lichen must be the third year's growth to yield an abundant dye, and that which grows near the sea is best. It loses half its weight by drying. A single person may gather from 20 to 30lbs. a day in situations where it abounds. No less than 2,239,685lbs. were manufactured at Christiannsund, Flekkefiort, and Fahrsund in Norway, in the course of the six years previous to 1812. [This gives an average of 166 tons per annum, which at the then market rate of £60, or upwards, yields a sum of £9,960, as the yearly proceed accruing from the sale of a plant, which its appearance would lead the casual observer to consider as worthless.—H. C.]—*Ure's Dictionary*, p. 53.

Parmelia saxatilis, Ach.

In Scotland is collected abundantly by the peasantry with *P. omphalodes*, to dye woollen stuffs of a dirty purple. It grows on trees, rocks, and stones, especially in mountainous districts.

Note.—The principal species of *Parmelia*, which I have sent for examination is very likely the *P. perforata*, the very next species in the *English Flora* to the above two.—H. C.

Peltidea aphthora, Ach.

This is the most British species of the genus. It derives its name from a circumstance related by Linnæus, that the Swedish peasants boil it in milk as a cure for the aphthæ or thrush in children.—*English Flora*, vol. v. p. 215.

Peltidea canina, Ach.

Formerly employed at the suggestion of Dr. Mead as a cure for the bite of a mad dog, whence the specific name.—*English Flora*, vol. v. p. 215.

Note.—Dr. Royle mentions this Lichen in his Illustrations as having been found in the Choor.—*Vol. i. p. 437.*

Gyrophora.

Various species of this genus, (and they are found in cold rocky situations, especially on granite in almost all parts of the world,) con-

stitute the *Tripe de Roche* of the Canadians, and with *G. proboscidea*, *G. villeda*, and a few other American species, Capt. Sir J. Franklin and his brave companions were supported in Arctic America during a season of want, such as happily few human beings have been subjected to. They are, however, bitter and nauseous, and can only be employed in the total absence of every other salutary food.—*English Flora*, vol. v. p. 217.

Note.—Berzelius has proposed removing the bitter principle of these Lichens, by macerating them in a weak solution of carbonate of potass, (one part to three hundred of water,) and afterwards washing them in cold water. This bitter principle has been called *Cetraria*, and imparts tonic properties to several of the species, as to *Borrera furfuraceæ* and others, which have been used for the same purpose as *Cetraria Islandica*, and some have been employed as a substitute for hops in the brewing of beer.—*Royle's Illustrations*, vol. i. p. 438.

Gyrophora cylindrica, Ach.

Is used in Ireland occasionally as food, and more frequently for dyeing woollen cloth of a brownish green colour.—*English Flora*, vol. v. p. 218.

Cetraria Islandica, Ach.

Although this plant is abundant in certain districts of Scotland, it has never with us been collected as an article of commerce. A considerable proportion of what comes to our shops, where it is in great request as a medicine in coughs, consumptions, &c. is procured from Norway and Ireland. Immense quantities are gathered in the latter country, not only for sale, but for their own use as an article of common food; the bitter and purgative quality being extracted by steeping in water. The Lichen is then dried, reduced to powder, and made into a cake, or boiled and eaten with milk, and eaten with thankfulness too by the poor natives, who confess "that a bountiful Providence send them bread out of the very stones."—*English Flora*, vol. v. p. 271.

Note.—The starchy substance which renders the *C. Islandica* nutritive and demulcent, is called *Lichenin*.—*Royle's Illustrations*, vol. i. p. 438.

Rocella tinctoria, DeCand.

This interesting Lichen is the famous Archill or Orchill; Orseille of the French, which yields the most valuable dye of all this tribe. Its several names are derived from a Florentine family of the Oricellarii, Riccellarii, or Riccellai, one of whom in the year 1300, carried on a considerable trade in the Levant, and returning with great wealth to Florence, first made known in Europe, the art of dyeing with this plant. Far more abundantly than with

us, it is the product of warm climates on maritime rocks in almost every part of the world, and always growing with *R. fuciformis*, DeCand, which might almost lead to the suspicion, that they were mere varieties of each other. The Canary Islands formerly yielded this Lichen in abundance, whence it has been called Canary weed; but so great has been its consumption of late years, that the best quality of it, whose average price is £200 per ton, (about 1-12 per seer, or Rs. 70 per maund,) has become extremely scarce, and what is commonly imported from other countries, is not worth £30 the ton, or Rs. 10 per maund, (a trifle more than three pence a pound, or 4 As. per seer.) The English blue broad cloths are first dyed with Archil, which gives their peculiar lustre and purple tint when viewed in a certain light.—*English Flora*, vol. v. p. 221.

M. Robiquet has separated the colouring matter of this vegetable. The new and singular product which he has obtained has a very sweet flavour, is easily soluble in water, colourless, crystalizes in beautiful flat quadrangular prisms; by means of a moderate heat it may be volatilized without decomposing, and does not acquire the colouring property till it has undergone successively the action of ammonia and of common air.—*Silliman's Journal*, vol. 18, in *English Flora*, vol. v. add. and corrig. p. 10.

Note.—*Roccella fuciformis*, DeCand, is said by Dr. Royle, (*Illustr. vol. i. p. 438*), to be more widely diffused than *R. tinctoria*, being found in Europe, Brazil, as well as in Ceylon and the Peninsula of India, whence several specimens have been sent to the Royal Asiatic Society; but it is far inferior in quality, containing indeed hardly any colouring matter.

Dr. Ure in his Dictionary of Arts and Manufactures, details under the article *Archil*, the different modes by which it may be rendered useful, and the reader who wishes to be acquainted with them cannot do better than consult the Dictionary. I may observe, that the *Chulchulera* of Hindoostan belongs to the Genera BORRION or *Evernia*, which are both in the same group with *ROCCELLA*, (the *Umbilicariæ*), and closely allied to it in exterior characters.

Evernia Prunastia, Ach.

Was brought into use in Glasgow by the late Lord Dundonald, and employed (during the war) instead of gum in calico-printing, it afterwards fell into disuse as a very inferior substitute for that article.—*English Flora*, vol. v. p. 224.

The next useful species noticed by Hooker is *Ramalina Fraxina*, Ach. which has been used in Glasgow for the same purpose as the *Evernia Prunastia*, (*Flora*, vol. v. p. 225); and from the apparent number of species of this Genus in the Himalayas, it might be turned to advantage.

In the next family the *Usneæ* are the *Usnea florida* and *U. barbata*, both abounding not only in the Himalayas, but in all parts of India, and in Ceylon, as well as in South America; where, according to Humboldt, the *Usnea barbata* is employed as a substitute for the *Roccella tinctoria*.

In the succeeding family, the *Corniculariæ*, we have the *Alectoria jubata*, Ach., or *Rockhair*, (which is found in the Himalayas as well as in Europe,) and is said by Linnæus to supply the rein-deer with food in winter when the snow is very deep upon the ground; for this purpose the Laplander cut down the trees, that the plant upon the topmost branches may be accessible to this useful animal.—*English Flora*, vol. v. p. 227.

The last useful species mentioned in Hooker, is the

Cladonia Rangiferina, Hoffm.

This for the greater part of the year, and especially in winter, is the support of vast herds of rein-deer, wherein consists all the wealth of the Laplanders. No vegetable, Linnæus tells us, grows throughout Lapland in such abundance as this, especially in woods of scattered pines, where for very many miles together, the surface of the sterile soil is covered with it as with snow. On the destruction of forests by fire, when no other plant will find nutriment, this Lichen springs up and flourishes, and after a few years, acquires its full size. Here the rein-deer are pastured, and whatever may be the depth of snow during the long winters of that climate, these creatures have the power of penetrating it and obtaining their necessary food. Linnæus has given a beautiful description of this Lichen, and of these animals whose support it is, in the *Flora Lapp.* p. 332, but it is too long for insertion in this place.—*English Flora*, vol. v. p. 235.

It appears (*Ure's Dictionary of Arts*, p. 53,) that the latest researches on the Lichens as objects of manufacture, are those of Westring of Stockholm. He examined 150 species, among which he found several which might be rendered useful. He recommends that the colouring matter should be extracted in the places where they grow, which would save a vast expence in curing, packing, carriage, and waste. He styles the colouring substance itself cutbear, persio or turnsole; and distributes the Lichens as follows: [Ure applies to all the generic name of *Lichen*. I have endeavoured to supply the new nomenclature from Hooker.* H. C.] 1st, Those which left to themselves exposed to moderate heat and moisture, may be fixed without a mordant upon silk or wool, such are the *L. cinerea*, (*Urceolaria cinerea*, Ach.); *L. hæmatonta*; *L. ventosus*, (*Lecanora ventosa*, Ach.); *L. corallinus*, (*Isidium corallinum*, Ach.); *L. Westringii*, (*Isidium Westringii*, Ach.); *L.*

* And have marked those with a (*) which are indigenous to, or have congeners, in the Himalyas.

saxatilis, (*Parmelia saxatilis*, Ach.); *L. conspassus*; *L. barbatus*, (*Usnea barbata*, Ach.); *L. plicatus*, (*Usnea plicata*, Ach.); *L. vulpinus*, Hud., (*Borreria flavicans*, Ach.); &c.

2. Those which develop a colouring matter fixable likewise without mordant, but which require boiling and a complicated preparation, such are *L. subcarneus*; *L. farinaceus*, (*Ramalina farinacea*, Ach.); *L. jubatus*, Linn. (*Olectoria jubata*, Ach.); *L. furfuraceus*, (*Borreria furfuracea*, Ach.); *L. pulmonarius*, (*Sticta pulmonaria*, Hook.); *L. cornigatus*; *L. cocciferus*, (*Scyphophorus cocciferus*, Hook.); *L. digitatus*, (*Scyphophorus digitatus*, Hook.); *L. uncialis*, (*Cladonia uncialis*, Hook.); *L. aduncus*, &c. Saltpetre or sea salt are requisite to improve the lustre and fastness of the dye, given by this group to silk.

3. Those which require a peculiar process to develop their colour; such as those which become purple through the agency of stale urine or ammonia. Westring recommends the following mode of testing: he put three or four drachms of the dried and powdered Lichen into a flask, moistened it with three or four measures of cold spring water; put the stuff to be dyed into the mixture, and left the flask in a cool place. Sometimes he added a little salt, saltpetre, quick-lime, or sulphate of copper. If no colour appeared he then moistened the Lichen with water, containing one-twentieth of sal ammoniac, and one-tenth of quick-lime, and set the mixture aside in a cool place from eight to fourteen days. There appeared in most cases, a reddish or violet coloured tint. Thus the *L. cinereus*, (*Urceolaria cinerea*, Ach.) dyed silk a deep carmelite, and wool a light carmelite; the *L. physodes*, (*Parmelia physodes*, Ach.) gave a yellowish gray; the *L. pustulatus* (*Umbilicaria pustulata*, Schrad.) a rose red; *L. sanguinarius*, (*Lecidea sanguinarius*, Ach.) gray; *L. tartareus*, (*Lecanora tartarea*, Ach.) a crimson red, &c.

I cannot conclude these extracts without giving an account from Ure of the *Orcine*, the name of the colouring principle of the *Lichen dealbatus*, Ach. (*Isidium paradoxum* of the same author,) styled by Messrs. Turner and Boner, a most beautiful production. The Lichen dried and pulverized is to be exhausted by boiling alcohol. The solution filtered hot, lets fall in the cooling crystalline flocks, which do not belong to the colouring matter. The supernatant alcohol is to be distilled off, the residuum is to be evaporated to the consistence of an extract, and triturated with water till this liquid will dissolve no more. The aqueous solution reduced to the consistence of syrup, and left to itself in a cool place, lets fall at the end of a few days, long brown brittle needles, which are to be freed by pressure from the mother-water and dried. That water being treated with animal charcoal, filtered and evaporated, will yield a second crop of crystals.

These are *Orcine*. Its taste is sweet and nauseous, it melts readily in a retort into a transparent liquid, and distils without undergoing any changes. It is soluble in water and alcohol. Nitric acid colours it blood-red; which colour afterwards disappears. Subacetate of lead precipitates it completely. Its conversion into the *Archil* red is effected by the action of an alkali, in contact with the air.

When dissolved for example in ammonia and exposed to the atmosphere, it takes a dingy brown-red hue; but when the *Orcine* is exposed to air charged with vapours of ammonia, it assumes by degrees a fine violet colour. To obtain this result, the *Orcine* in powder should be placed in a capsule, alongside of a saucer containing water of ammonia, and both should be covered a large bell-glass; whenever the *Orcine* has acquired a dark brown cast, it must be withdrawn from under the bell, and the excess of ammonia be allowed to volatilize. As soon as the smell of ammonia is gone, the *Orcine* is to be dissolved in water; and then a few drops of ammonia being poured into the brownish liquid, it assumes a magnificent reddish violet colour. Acetic acid precipitates the red lake of Lichen.

If the above pages contain a single hint which have escaped the researches of your able Curator, or others interested in his researches, I shall be amply repaid for the small trouble of transcribing them, and have the honor to remain,

Sir,

Your obedient servant,

Dehlee, 5th October, 1841.

HENRY COPE.

A Fourth Memoir on the LAW OF STORMS IN INDIA, being remarks and documents relative to the loss of the Ship GOLCONDA, in the Tyfoons of 22nd to 24th September 1840, in the China Sea. By HENRY PIDDINGTON, ESQ.

This memoir has arisen out of a question proposed to me by Mr. Greenlaw, the active Secretary to the Marine Board, which was in substance this: "*On what day do you think the Golconda was lost?*" I found that the investigation which I undertook in order to reply to it with greatest possible precision, elicited facts of so much importance that they might be worth publication as a separate memoir; not only as records distinctly shewing the truth of the Law of Storms for the China Seas, but as affording to seamen a valuable practical lesson; for

as will be seen, we have here, of three, two ships which ran into the storms, of which one foundered, and the other was in great danger : while the third by heaving to, in due time and place, escaped all damage !

The *Golconda*, as my Indian readers well know, was sent from Madras, with the head quarters and a detachment of the 37th Madras Native Infantry on board, to reinforce the expedition in China. Together with her crew, there must have been nearly 400 souls embarked in her : she was seen on the 10th September standing out of the Straits of Singapore, by the *Calcutta Thetis*, as noted in Captain Roche's reply to my queries, and again in Lat. $13^{\circ} 44' N.$ Long. $112^{\circ} 58' E.$ by the *Thomas King*, as Captain Roche also states, since which time she has never been heard of. It is supposed she must have perished in the Typhoon of the 22nd to 24th September, in which the *London Thetis* and the *Calcutta Thetis* both suffered greatly ; the latter being dismasted.

It may perhaps be necessary to remark here, to those who are not professionally acquainted with the navigation of the China seas, that there are two routes from Singapore to Canton during the S. W. monsoon, the one being along the coast of Cochin China, and the other, the usual track, between the Macclesfield Bank and the Paracels. We are certain, from the *Golconda's* having been seen on the 18th September, that she took the usual route, which was also that pursued by the *London* and *Calcutta Thetis* ; and as I shall shew, there seems to be the utmost probability that she ran into, or was overtaken by the centre of one of the hurricanes which those ships met with, in which she foundered. She was, I believe, an old ship ; but her commander was a gentleman of much nautical knowledge and experience, though it is possible that, like so many more, he was not fully aware of the advantages derivable from due attention to this valuable class of knowledge.

As we have obtained the Log of the *Calcutta*, and a detailed report from the *London Thetis*, I have first given these. I have then followed them by a comparative table of the winds and weather at noon and midnight of each day ; and finally by a summary, shewing how the evidence goes to prove distinctly enough, that there were *two* storms travelling, the one to the WNW. and the other to the NNW. as will be seen by a careful comparison of the table, and the outline chart.

This is an additional reason, when ships are in the proper quarter of the storm circle, for heaving to, rather than scudding.

Report of the Ship Thetis of London reduced to Civil time.

In compliance with your letter received this morning, I forward you the particulars of a gale of wind encountered in the China Sea in September, 1840.

19th September.—Light Southerly winds, with hot sultry weather

{	Thermometer,	86 $\frac{1}{4}$ °
{	Barometer,..... ..	29. 94
{	Lat. by Observation, ..	14° 94' N.
{	Long. Chron.	113° 39' E.
	Calm during the night.	

20th September.—South Easterly airs towards morning, noon calm and sultry.

{	Thermometer,... ..	87°
{	Barometer,	29. 90
{	Lat. observation,	14° 53' N.
{	Long. Chron... ..	114° 9' E.

P. M.—Light NW. winds, with gloomy sky and close weather, midnight close weather.

21st September—Noon rain and thunder, with squally weather, wind NW.

{	Lat. Observation, ...	15° 57' N.
{	Longitude, Chron....	115° 9' E.
{	Thermometer,.. ..	84°
{	Barometer,	29. 87

Sympiesometer very unsteady from 29. to 29.30 during these 24 hours.

P. M.—Wind at NW. with squalls and lightning in the NW.

8. P. M.—Finer weather, midnight squally. Barometer falling gradually, wind very unsteady between W. and NW. large drops of rain.

22nd September.—Daylight strong breeze at WNW., heavy sea from NE., sent down the top gallant yards and masts, and otherwise made snug; the sky very wild and threatening. Noon, glass still falling; sea rising higher from the northward, and the wind increasing at NNW. Furled the top-sails and lay to under try-sails.

{	Thermometer,	85½°
	Barometer,.....	29. 64
	Sympiesometer,.....	29. 12
	Lat. indiff. Obsn.	16° 20' N.
	Longitude,... ..	115° 30' E.

P. M.—Wind increasing at NW. till midnight, and gradually veering to WNW., blowing a violent gale with terrific squalls: Barometer still falling.

23rd September—A. M. Wind veered to West, blowing almost a hurricane. At 4 veered to WSW. still unabated, and at daylight veered to SW., force of the gale still unabated and continued so till noon; lightning all round, squalls very violent, but some appearance of amendment in the weather.

No observations. Position from observations next day.

{	Sympiesometer at noon,	28. 70
	Barometer,... ..	29. 20
	Lat. Observation,	16° 40' N.
	Longitude,... ..	116° 15' E.

P. M.—Gale moderating fast, veering to South; 5 P. M. made sail, and ran before it, sea rising *more than in the height of the gale*. Midnight, Barometer 29. 50.

24th September—A. M. Moderating, and veering to Eastward of South. Squalls with rain. Noon moderate winds SSE.

{	Lat. Observation,... ..	18° 25' N.
	Longitude,... ..	117° 20' E.
	Thermometer,... ..	81½°
	Barometer,	29. 80

From this time till the 26th, on which day we arrived at Macao, the wind continued S. Easterly and moderate, and the sea very confused. I there heard that vessels which arrived the day before us experienced a gale, commencing at North and veering to *East*, instead of to the West, as I experienced it, and those who arrived a day or so after us, had experienced a strong steady SW. gale upon the 22d and 23d.

I also beg further to state, that the *Golconda*, now missing, sailed 24 hours before us from Singapore, also bound to Macao; and the *Thetis* of Calcutta, which ship arrived sometime after *dismasted*, I believe left Singapore a few hours after us. Another vessel in com-

pany with us just before the gale arrived like ourselves without damage, all which circumstances would lead to the inference, that the gale was partial in its violence, as well as different in its direction. I shall be happy to communicate any further particulars, if I have omitted any thing you might wish to know.

The following Statement is abridged from the Log Book of the CALCUTTA THETIS, and the reply of Captain Roche, commanding her, to some queries addressed by me to him. The dates relate to civil time.

The *Calcutta Thetis* left Singapore on the 13th September at day light; she had light Southerly and SW. 3 and 4 knot (rarely 5 knot) breezes to the 20th; having passed Pulo Sapata at 9½ A. M. on the 18th, on which day at noon her Lat. was 10° 10' N. Long. 109° 24' E.; on the 19th she was in Lat. 11° 44' N. Long. 111° 16' E. Bar. 29.79 Ther. 92°. Current for the past 24 hours, NE. by E. 71 miles, having had 60 miles to the NE. the two preceding days.

20th September.—She was steering NE. with SW. and WSW. airs and fine weather. At noon. Lat. 12° 40' N. Long. Chr. 111° 56' 45" E. Bar. 29.79. Ther. 89°. Current NE. $\frac{3}{4}$ E. 18 miles. At Midnight squally weather.

21st September.—Fine and smooth water; light airs from WNW. till 7 A. M. At noon Lat. 15° 20' N. Long. Chr. 112° 40' E. Bar. 29.70. Ther. 89°. A light drain of current to the NE.; 7 P. M. breeze freshening from NNW. with squalls. Course NE. going 6.4 knots. At midnight thick cloudy hazy weather.

22nd September.—Running to the NE. as before, with wind at NNW. to 4 A. M. when it was NW. Day-light thick unsettled weather, with a head sea; going 5 knots to NE. with wind WNW. Noon Lat. 14° 55' N. Long. Chr. 114° 17' E. Bar. 29.56. Ther. 86°. Current NE. $\frac{1}{2}$ N. 16 miles. Wind W by S.—P. M. strong breezes WSW. and SW. At 5 P. M. every appearance of bad weather; sea rising from NE. made all preparations. At 9° 30' heavy squalls, wind being at SW. from 6. P. M.; split the foresail. Midnight, ship under mizen trysail and fore topmast staysail, incessant and increasing squalls, and sea getting up from the SW.; heavy rain.

23rd September.—A. M. Blowing a typhoon from SW. gusts tremendous, and in rapid succession. Bar. fell from 29.40 to 28.80 in

the two hours preceding midnight. Impossible to keep before the wind ; broached to twice. At 3 h. 30' A.M. blowing a perfect tyfoon from SW. ; hove to under the mizen try-sail. Day-light, tyfoon blowing most furiously, with a high turbulent sea, but vessel making good weather. 7 A. M. Gusts more furious, mizen try-sail blown away, and sails blowing from the yards, though secured by lashings. Wind SW. throughout. Ship lying to with head from NW. to N by W. During the morning lost mizen topmast and fore and main top gallant masts. Noon hurricane as before, sea high and cross ; wind veering to the Southward. Lat. account $15^{\circ} 50'$. Longitude account $115^{\circ} 13'$ E. Bar. falling gradually from noon of the 22nd to 10 P. M. of the same date, when it was at 29.40, and at midnight fell to 28.80 as before mentioned. Midnight the same, but squalls not so frequent or so heavy ; sea very cross ; wind SW.

24th September.—A. M. Wind marked SSW. Heavy tyfoon and high cross sea. Vessel labouring much. At 2 A. M. the Bar. at 28.70, the lowest depression. About this time the heaviest of the storm. Towards 4 P. M. Bar. rose gradually. Wind South at 5 A. M. Daylight moderating, but the wind falling fast, caused the ship to roll so much, that by noon she had rolled away her main-mast, and suffered much damage. Noon, Lat. $17^{\circ} 14'$ N. Long. account $115^{\circ} 11' 35''$ E. Bar. 29.40. Gale breaking and wind South. At 8 P. M. SSE. with hazy weather. The foremast was saved with much difficulty by cutting away the topmast and fore yard. At one time the vessel, by the pumps being stove by the fall of the mast, had three feet water in her hold. Midnight moderate and hazy.

25th September.—Noon, Lat. $18^{\circ} 25'$ N. Longitude $115^{\circ} 57'$ E.

Captain Roche remarks, that, “at the commencement we had a good deal of lightning, with not much thunder or rain, and indeed through the height of the storm scarcely any, till about between 2 and 4 A. M. of the 24th, after which the gale was on the decline. The Longitudes are from the means of three watches, which were found correct on making the land.”

I annex a tabular Statement, shewing the relative position of the two ships, as marked on the Chart annexed to the Memoir.

Tabular view of the Hurricane of 22nd to 24th September 1840, in the China Sea, as experienced by the ships THETIS of LONDON and THETIS of CALCUTTA.

Date.	Ships' Names.	Winds and Weather.	Lat. N.	Lon. E.	Bar.	Simp.	Ther.	Remarks.
19th Sept. at Noon.	{ London Thetis, } Calcutta Thetis,	Light Southerly, hot and sultry weather, Light SW. airs and fine,	0 1 14 20 11 44	0 1 113 39 111 15	29.94 29.79	0 0	86 $\frac{1}{4}$ ^o 92 ^o	
20th Sept. at Noon.	{ London Thetis, } Calcutta Thetis,	Calms and Light SE. airs, sultry, SW. and WSW. airs and fine,	14 53 12 40	114 9 111 57	29.90 29.79	0 0	87 89	At Midnight squally weather.
21st Sept. at Noon.	{ London Thetis, } Calcutta Thetis,	Light NW. winds, gloo- my and close, Light from WNW. till 7 P.M. at 7 breeze freshen- ing from NNW. thick cloudy weather,	15 57 13 20	115 9 112 40	29.87 29.70	29.30 0	{ 84 89	{ Noon rain, thunder, and squally; wind NW. Simp. very unsteady during this 24 hours.

Date.	Ships' Names.	Winds and Weather.	Lat. N.	Lon. E.	Bar.	Simp.	Ther.	Remarks.
22nd Sept. at Noon.	{ London Thetis, Caleutta Thetis, }	NNW. Increasing breeze { and sea, }	0 1 16 20	0 1 115 30	29.64 29.56	29.12 0	85½ 86	{ Threatening ; sea rising ; glass falling, and wind increasing ; hove to. Increasing with gloomy wea- ther ; running to the NE.
22nd Sept. at Midnight.	{ London Thetis, Caleutta Thetis, }	WNW. violent gale, { terrific squalls, } SW. Increasing and incessant squalls ; running to the NE. and NW. since noon,	0 0	0 0	0 0	0 0	0 0	Bar. still falling. Sea getting up from SW.
23rd Sept. at Noon.*	{ London Thetis, Caleutta Thetis, }	SW. almost a hurricane, .. SW. furious typhoon, ly- ing to,	16 40 15 50	116 15 115 13	29.20 28.80	28.73 0		No abatement. High sea ; lost mizen topmast.
23rd Sept. at Midnight.	{ London Thetis, Caleutta Thetis, }	About South, moder- ating fast, SW. Heavy typhoon, { squalls not so frequent, .. }	0 0	0 0	29.50 0	0 0	0 0	{ Bore up at 5 p.m. Sea high- er than in the gale. Sea very cross.
24th Sept. at Noon.	{ London Thetis, Caleutta Thetis, }	SSE. Moderate, S. Gale breaking, ..	18 25 17 14	117 20 115 35	29.80 29.40	0 0	81½ 0	{ Fine and squalls, wind SE. and moderate to Macao. A.M. Rolled away the main mast, &c.; at 8 p.m., wind SSE.

* Calcutta probably lost about this time.

We have now to examine the construction of the Chart, and the evidence there is for the two storms as there laid down.

Taking first the *London Thetis*, as the vessel which was farthest to the northward, we find her on the 21st September with the wind at NW. with ugly weather, and the *Simpiesometer* warning her by its oscillations, of bad weather for the whole previous 24 hours; being moreover 0.50 to 0.80 below the Barometer!* The *Calcutta Thetis* had thick cloudy weather, with a smart breeze at NNW.; her Barometer sinking to 29. 70

At noon on the 22nd, the *London Thetis*, with the sea rising from the NE. and Northward, the wind increasing from NNW. the weather threatening, and the glasses still warning, very properly hove to under trysails. We may take the storm to have fairly begun with her now, and I have thus laid down its centre as bearing from her about 130 miles to the ENE., which, assuming it to be a circular storm, would give it a diameter of 260 miles.

The *Calcutta Thetis* at the same time has the wind a strong breeze at W. by S. to which point her NNW. breeze had gradually veered; her Barometer had fallen to 29.56, with threatening weather and a head sea, the ship always running to the NE. from 6 to 5 knots an hour. If we look at the circle of the *London Thetis* storm, we see that this could not be the same; for if we extended it to here, it would give us the wind at about NW. by W. instead of W. by S. while it is to be particularly noted, that the changes of wind which the *Calcutta Thetis* has from 7 P. M. of 21st to 4 A. M. and noon of the 22nd, are exactly such as should occur from a ship, and a circular storm running on the tracks which I have laid down: the ship in fact *chasing* the storm! Thus it will be seen that at 4 A. M. when it was NW. the first circle on the track of this storm makes it so, and this track must be the right one, because the wind being W by S. at noon, clearly shews, that the ship had passed to the Eastward of the meridian of the centre at that time, *i. e.* the centre was bearing N by W. from her if it was a circle. I do not fail to observe, that by this track she is placed within a much shorter distance of the centre at this time than afterwards on the 22nd at midnight, and during the 23rd, when the greatest fall

* A very beautiful instance of the importance of this invaluable instrument.

of the Barometer was experienced, and the storm was raging in its greatest fury ; but it does not appear to me, that the winds from noon of the 22nd, the time it was at W by S. to the following midnight, and to noon of the 23rd, when it was a steady SW. tyfoon, allow us to assign any other track. We may either suppose that the storm was only forming on the 21st, or that the track curved away to the Eastward to account for this possible anomaly in the distance from the centres. It is certain a storm must begin somewhere, and I presume it here to have done so on the same line as that on which we find we can track it as a completely developed hurricane.

Again ; if we attempt also to extend the circles of this storm at this time, noon 22nd, to the *London Thetis*, we shall find that it would give a SSE. wind, instead of a steady NNW. one, with every appearance of a storm and this storm really setting in a few hours after, with exactly the changes of wind which should, by the theory, occur. I may perhaps be thought prolix in this explanation of my reasons for laying them down as two separate storms ; but I have thought it very essential to our object, which is both to register the facts, and to draw useful conclusions from them, to shew carefully upon what grounds any thing is supposed to be proved which we assume or lay down.

At midnight 22nd-23rd, we find that the *London Thetis* has a violent gale WNW. with terrific squalls and Barometer still falling. The WNW. wind would place the centre bearing NNE. from her, and allowing for her drift from noon, when she so prudently love to, the centre at this time may be about where we have placed it. The *Calcutta Thetis* has the wind at this time at SW. a tremendous gale also, which of course makes the centre of her storm bearing NW. from her as I have placed it, and it will be observed that the same discrepancy would exist, as before if we attempt to extend the circle of the one ship's storm to the place of the other ; shewing I think to demonstration, (for the places of both ships are perfectly well ascertained,) that there must then have been the two storms which I have laid down.

There is a very remarkable fall of the *Calcutta Thetis*' Barometer ; viz. 29.40 to 28.80, or more than half an inch in the two hours preceding this epoch (midnight of 23rd) and we find that at 2 A. M. on the 21st

it had reached its maximum depression of 28.70. Now we have not, unfortunately, the *London Thetis'* Barometer for this moment, but we *may* suppose this fall to have arisen from the near appulse of the two tempests? There *may* have been a point, midway between them at which the barometrical depression arising from both storms may have operated, though the winds were directly opposed. What this produced we know not. It might have been a calm, but it was quite as probably, a succession of awful gusts from every quarter of the compass mixed with calms, (almost as dangerous in such weather,) much resembling the sort of weather which every seaman has seen near the line, on the coasts of Africa, or on those of Borneo, in violent thunder storms of long duration; but of course far more violent, and with a most dangerous sea. At noon of the 23rd, the *London Thetis'* storm having travelled onwards, as by the track, and the vessel having drifted the other way, she has the wind at SW. and "some appearance of amendment," though the Simpiesometer and Barometer are still at the lowest registered depression. By 5 P. M. she could bear up, the storm, having veered to South, and what is worthy of remark, we find that as she approaches and crosses the track we have laid down for that of the centre of the storm, she has then the "sea rising *more* than in the height of the gale,"! which is some evidence that we are not far wrong.

The *Calcutta Thetis*, which was now, providentially, lying to, had the weather at noon of the 23rd terrific; but towards midnight she has fewer squalls, the wind veering to SSW. after that time, and to South by daylight on the 24th. At noon, it fell so fast, that she rolled away her mainmast, and was nearly foundering by her pumps being destroyed by the fall of the mast.*

She did not cross the previous track of her own storm after she bore up, but that of the *London Thetis'* storm is close to her position at noon; and though the sea had had 24 hours to go down since the centre passed, the latter portion of it, and that part of the sea of the *Calcutta Thetis'* storm which reaches this point, may well have assisted to produce this dangerous sea.

I have thus shewn, I hope distinctly, and almost to a mathematical certainty, that there were two storms. From the logs of single ships,

* This is worthy the attention of seamen and owners. The pumps, especially in small vessels, seem placed to insure the most frequent occurrence possible, of this fatal accident; and no doubt vessels have been frequently lost through it.

the tracks are not easily laid down very correctly, so that allowance must be made for this imperfection. To say *where* the unfortunate *Golconda* perished is of course impossible, for like the *Calcutta Thetis*, which was in great danger, she may have foundered after the storm. The probability, however, is, that she was tempted by the Westerly breeze to run on, as the *Calcutta Thetis* was, and was thus lost by running into the centre of the tyfoon. There have been, even with our limited knowledge and field of research, so many instances of this kind, (See Third Memoir in Journal Asiatic Society, vol. ix, p. 1053) that we are not judging harshly, I think, if we suppose this awful loss to have arisen from another of them. The lesson afforded by this investigation is one which the dullest may read. Of three ships exposed to storms of the same kind, the commander of one, taking due warning, and probably well acquainted with the Theory of Storms, heaves to and makes all snug, which is what ought to have been done; for he was in the South-Western quadrant of a storm travelling across and ahead of him. The second, with less warning it is true, having apparently no Simpiesometer on board, and tempted by the fair wind, runs on and narrowly escapes foundering; for as will be seen, he runs along the South-Eastern edge of his storm; and the third we may easily suppose to have perished through an error of the same kind leading him farther and into the dangerous centre.

I ought not to omit remarking here, the exact confirmation of the theory, which we find in the report of the *London Thetis*, when Captain Cass mentions that the ships ahead of him had gales at North veering to Eastward. This is exactly what should occur, and proves to a certainty, that this tyfoon was a rotatory storm. I should mention also, that the storm-circles on the chart are not struck with any reference to the sizes of the vortices, of which we know nothing, but simply to shew the winds at noon and midnight; and from centres upon the supposed tracks of the tyfoons as far as these can be ascertained by careful projection.

112°

115° E Long^t

118°

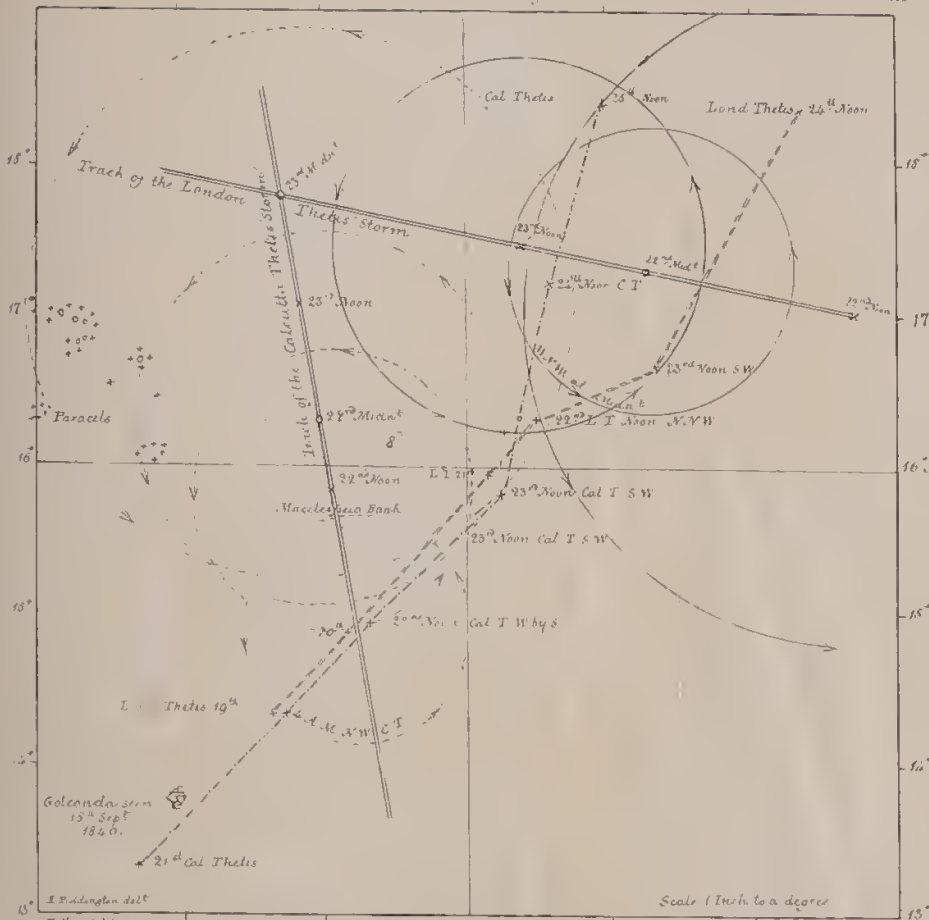


Chart to show the tracks of the Ship *Thetis* of London and *Thetis* of Calcutta through the Typhoons of the 22nd to 24th Sept^r 1860 in the China Sea

Classified Catalogue of Mammals of Nepal, (corrected to end of 1841, first printed in 1832.) By B. H. HODGSON, Bengal Civil Service.

BIMANA.

O. Homo Sapiens.—Mass of population belongs to Kalmuc subdivision of the Great Mongolian stirps, with some admixture of Indian stock. In the *Tarai* and low valleys of the hills, are some traces of aborigines of Southern race, like the Bheels, Coles, &c. These latter are denominated Thárû, Denwâr, Durre, Manjhi, and Brahmo.

N.B.—As to location, the following initial letters signify as follows:—H. is habitat, and G. after it is general, that is, both *Tarai* and all three regions of the hills. L. is lower hilly region. C. is central hilly region, and N. is northern hilly region. T. is *Tarai* and saul forest, or the plains at the base of the mountains. For a general sketch of features and character of the above four regions, see Catalogue as first printed *apud* Journal. Asiatic Society.

QUADRUMANA.

SIMIADÆ.

1. *Semnopithecus necnon Cercopithecus.*—Gen. ch. nobis. Facial angle 45 to 50: face flat: nose short with long narrow lateral nares: limbs long: thumbs small remote: no cheek pouches: 5th tubercle on last molar present or absent: callosities large: canines variable, large only in grown males: stomach sacculated and banded as well as intestines: tail very long, commonly tufted, and exceeding the length of the animal. Agile, grave, gregarious, not docile.

1. Sp. new. schistaceus nob. (Nipalensis of former catalogue, see remark at end.)

H. T. and L. more rarely C. and N. even.

2-3. *Macacus? Pithecia*, Nob.—Gen. ch. nob. Facial angle 50: muzzle not elongated. Callosities and cheek pouches large. Buttocks often nude. Structure compacter, but generally like that of *Semnopithecus*; limbs shorter, thumbs larger, orbits more salient, head rounder, canines similarly variable, nares shorter,

rounder, and more terminal stomach simple. Cæcum and rectum sacculated. Tail equal to half the length of the animal. Agile, lively, gregarious, familiar and docile.

2. Sp. new. Oinops et Pelops, nob.

H. of the first, T. L. and C.—of the second, N.

VESPERTILIONIDÆ.

RHINOLPHINÆ.

4-5. *Rhinolphus*.—2 Sp. new. Armiger et Tragatus, Nob. H. C. so far as known.

PTEROPINÆ.

6-7. *Pteropus*.—2 Sp. new. Leucocephalus et Pirivarus, Nob. The first is alleged to be identical with Medius Auct ; H. T. passer in hills.

VESPERTILIONINÆ.

8-12. *Vespertilio*.—5 Sp. new. Formosa, Fuliginosa, Subbadia. Muricola et Labiata Nob. H. C. so far as known.

FERÆ VEL CARNIVORA.

FELIDÆ, genus—FELIS, subgenera.

13-19. *Felis*.—7. Sp. Tigris, Pardus, Leopardus, Macrocelis, Nepalensis Auct. Vivérriceps et Murmensis, Nob. Viverriceps is identical with Viverrinus Auct. Of 1, 2, 3. H. G. ; of 4, 5, 7. C. ; of 6. T. but Leopards are nearly confined to the hills.

20. *Lynchus*.—1. Sp. new. Erythrotus, Nob. apparently identical with F. Chaus Auct. H. G.

CANIDÆ, genus—CANIS, subgenera.

21. *Canis*.—1. Sp. domestic, two varieties of the Mastiff and two of the Terrier of Tibet ; the Pariar of the plains, and cross-breeds with the first ; of 4 first H. N. ; of rest, G.

22-23. *Vulpes*.—2. Sp. Indicus, Nob. et Montanus, Pearson. Indicus is apparently identical with Bengalensis, Neenon Kookri, H. of first T ; of second, C. and N.

24. *Sacalius*, Smith, *Oxygoüs*, Nob.—Jackall, 1. Sp. Indicus, Nob. var. of Aureus ? H. G.

25. *Cuon* Nob.—General structure and dentition of *Canis*, but molars $\frac{6}{6} \frac{6}{6}$ only, the 2d tubercular being deficient. Odour and aspect of the last. Head blunter. Tail and ears larger. Teats 12 to 14. Venatory, gregarious, does not burrow.

1. Sp. *Cuon Primævus* Nob. type.—*Canis Primævus* of Bengal. Asiatic Society's Transactions, (subsequently named the type-*Chrysæus* by Smith.) H. L. C. and N.

MUSTELIDÆ.

VIVERRINÆ.

26-27. *Herpestes*.—2 Sp. new. *Grisus*, Auct. et *Auropunctatus* Nob. The latter is alleged to be identical with *Edwardsii* Auct. H. T. and C. respectively.

28-29. *Viverra* Auct.* Size large, robust habit, never climbs, thumb not remote, nails obtuse.

2. Sp. new. *Melanurus* et *Civettoides*, Nob. H. G.

303.1. *Viverricula*, Nob.—Size small, scansorial, habit vermiform, nails more or less raptorial, and thumb remote, pouch as in *Viverra*.

2.—Sp. *Indica* et *Rasse* Auct. H. T.

32. *Prionodon*.—1. Sp. new. *Pardicolor* Nobis, H. C. and N.

33-35. *Paradoxurus*.—3 Sp. new. *Hirsutus*, *Nepalensis*. et *Laniger*, H. T. C. N. respectively.

N. B.—First possibly identical with *Bondar*.

36. *Ailurus*.—1 Sp. *Fulgens* Auct. the *Wah*, H. N.

MUSTELINÆ.

37-40. *Mustela*.—4 Sp. *M. Erminea* Auct and three new, *Hemachalanus* et *Calotis* et *Auriventer* vel *Cathia*, Nob. H. C.

41. *Martes*.—1. Sp. *Flavigula* Auct. H. C.

42-47. *Lutra*.—6. Sp. *Leptonyx* et *Nair* Auct. and four new. *Tarayensis* *Monticola*, *Indigitata*, *Aurobrunnea*, Nob. H. of 3 first is T.; of 3 next, L. and C.

48. *Gulo*.—1. Sp. new. *Nipalensis*, Nob. (alleged to be identical with *Helictis moschatus* of Gray, and also with *Gulo Orientalis* of Horsfield.) H. L.

* These are differential characters merely and are ours. See *Viverricula*.

49. *Mesobema (olim Urva) Nob.*—Teeth as in *Herpestes*, but blunter; structure and aspect precisely mediate between *Herpestes* and *Gulo*. On either side the anus a large hollow smooth-lined gland secreting an aqueous fœtid humour, which the animal ejects posteally with force. No subsidiary glands, nor any unctuous fragrant secretion. Teats 6, remote and ventral; orbits incomplete. Parietes of the scull tumid, with small cristæ.

1. Sp. M. *Cancrivora*, Nob. type: the *Gulo Urva* of Asiatic Journal, Nob. H. L. and C.

URSINÆ.

50. *Ursitaxus*, Nob.—Molars $\frac{4}{4}$. $\frac{4}{4}$. of ursine flatness almost on the crown, but the last above transverse, and less than the carnassial tooth. Aspect and size of *Taxus*. No ears, coarse scant hair, anal glands as in *Mydans*. Genital organ bony, and annulated spirally. Typically plantigrade and fossorial. Carnivorous. Teats 4 in a transverse parallelogram.

1. Sp. *Inauritus* Nob. Indian Badger of Pennant and Hardwicke type. H. L.

N. B.—This form I still think is erroneously sought to be identified with *Ratelus Mellivorus*.

51-52. *Ursus*.—2. Sp. *Tibetanus* et *Isabellinus* Auct. H. of first is C. second N.

53. *Prochilus*.—1. Sp. *Labiatus* Auct. H. T.

SORECIDÆ.

54-56. *Erinaceus*.—3. Sp. *Spatangus Collaris*, et *Grayii* Auct. H. C.

57-58. *Sorex*.—2. Sp. *Indicus* Auct. et *Pygmæus* Nob. H. G.

59. *Talpa*—1. Sp. new. *Micrurus* Nob.* H. C. and N.

* Specific. Character Uniform velvet black with silvery grey gloss iridescent when moist; nude snout; feet and tail, fleshy white; the last very minute; structure otherwise typical. Snout to rump $4\frac{3}{4}$ inches. Head $1\frac{1}{4}$. Tail $\frac{3}{16}$. Palma and nails $\frac{7}{8}$. Planta and nails $\frac{13}{16}$.

UNGULATA.

PACHYDERMES.

60. *Elephas*.—1. Sp. Indicus Auct. two varieties, *Isodactylus* et *Heterodactylus* Nob. H. T.
 61. *Rhinoceros*.—1 Sp. Indicus Auct. H. T.

ANAPLOTHERES.

62. *Sus*.—1 Sp. S. Aper Auct. the wild Boar, two varieties, *Aipomus* et *Isonotus* Nob. H. G.

EDENTATES.

63. *Manis*.—1 Sp. new. *Auritus* Nob. alleged to be identical with the common Indian type or *Pentadactylus*. H. G.

RUMINANTES.

BOVINÆ.

Genus *Bos*. Subgenera?

64. *Bos*.—Cranium moderate, proportional, or without excess in the cerebral or facial region; frontals shorter than the face, flat, and not broader than long. Occipital plane of the skull quadrangular, never arched along the culmenal line, nor indented by the temporal fossæ, smaller much than the frontal plane and forming an acute angle therewith. Horns attached to the highest line of the forehead, rounded, moderate, curved up or down or forward; 13 pairs of ribs; no true dorsal ridge, but sometimes a fleshy hump; dewlap and muzzle large and square.

1 Sp. and type, *Bos Domest*: Nipalese varieties of. H. G.

N.B.—These Bovine characters are all ours. See *Journal Asiatic*.

65. *Bibos Nobis*.—Cranium large, massive, exhibiting preponderance of the frontal and cerebral portion over the facial; frontals as long as the face, concave, broader than long, and surmounted by a large salient crest ascending above the highest bases of the horns. Occipital plane of the skull spheroidal, very large, larger than the frontal plane, deeply indented in its centre by the temporal fossæ, and forming an acute angle with

the frontal plane. Horns attached below the highest line of the frontals, massive but short, ovoid or subtrigonal, and curving ascendantly; thirteen pairs of ribs; a true dorsal ridge co-extensive with the ribs and terminating abruptly; dewlap and muzzle small; period of gestation longer than in *Bos*.

1 Sp. and type. *Bibos Cavifrons*: probably the *Bos Gaurus* of authors. H. T.

N. B.—*Gavæus*, an aberrant species leading to *Bos*?

66. *Bison*.—Cranium moderate, depressed, inclining to Bubaline forms in the excess of the facial portion over the frontal, and in the rounding off of the frontals into the occiput; frontals decidedly broader than long, more or less convex, and forming an obtuse angle with the semi-circular or trigonal occipital plane which is strongly ridged by the parietes at its summit, is smaller than the frontal plane, and moderately indented. Horns attached rather in advance of the parietal apex of the cranium, small, rounded, curving ascendantly, or out of the horizontal; 14 (or 15) pairs of ribs; a true dorsal ridge, but confined to the withers, and terminating posteally in a gradual slope; dewlap none; muzzle small. Types *B. Americanus* et *Pœphagus*.

1. Sp. *Pœphagus* in Nepal. H. N. and also Tibet.

67. *Bubalus*.—Cranium large, elongate, compressed or narrow, disproportional, exhibiting great excess (a 3rd) in the facial over the frontal or cerebral portion; frontals short, narrow, convex, usually forming an obtuse angle with the occipital plane, which is large and circular in proportion to the obtuseness of that angle, and to the consequent rounding off of the culминаl line of separation; parietals merged, not ridged as in the last, nor culmenal. Horns attached to the ends of the highest line of the skull, always exceeding in length that of the cranium, and usually greatly so, depressed, strictly trigonal, and neither ascending nor descending, but directed horizontally backwards; thirteen pairs of ribs; no true dorsal ridge nor fleshy haunch; muzzle large and square; dewlap medial.

1. Sp. and type, *Bubalus Arna*, fœm. *Arnee*, two varieties. *Macrocerus*, et *Speirocerus*, Nob. H. T.

ANTELOPIDÆ VEL CAPRIDÆ.

- 68-69. *Antelopa*.—2 Sp. *Cervicapra* Auct. et *Pennettii* Auct ? *Bharatensis*, Nob. Vulgo, the Chouka or Ravine Deer. It seems to be identical with *Africana* Auct. H. T.
70. *Pantholops* Nob.—Molars $\frac{5}{6} \frac{5}{5}$, incisors erect, strong and rectilinearly ranged. Horns with clear sinus in cores, long, slender, erect, sublyrate, inserted between the orbits, compressed, nodose, and approximated at their bases. Large inguinal purses. No suborbital sinus. Nose ovine, bluff and hairy. Large intermaxillary pouches or subsidiary nostrils. Knees simple. Ears pointed, short. Tail short, full. Hoofs low, broad and padded with large interdigital pores. Size, habits, and general aspect of *Antelopa* et *Gazella*. Females hornless, with lesser inguinal purses, and two teats.
1.—Sp. new, and type *Antelope Hodgsonii* of Abel; the Chiru of Tibet. H. N. *transnivem*.
71. *Tetracerus*.—1 Sp. *Chickara neenou Quadricornis* Auct. *Chousingha* of Hindoos. H. T.
- 72-73. *Nemorhædus vel Kemas*.—2 Sp. *Goral* (*Hardwickii*) et *Proclivus* vel *Thâr* Nob. H. C. and N.
74. *Capra, wild.*—1 Sp. *C. Ibex* Himalayan variety and tame, two varieties of the common Goat and two of the Shawl Goat, or Sinal; 1 2, Doogoo; 3, Chângra; 4, Chappoo. H of 1, is N.; of 2, 3, C.; of 4, 5, N. and Tibet.
75. *Hemitragus* Nob.—General structure, odour, and horns of *Capra*, but having a small moist muzzle and four teats in the females; no interdigital pores. H. N.
1.—Sp. and type, *Capra Quadrimammis* vel *Jharal* Nob. C. *Jemlaica* of H. Smith?
N.B.—Mr. Ogilby has unwisely confounded this type with his *Kemas*, the characters of which group were, by the by, first correctly stated by myself, as were those of *Hemitragus*. The *Goral* or type, or *Kemas* has, (besides a larger muzzle than that of *Jharal*,) interdigital pores; the *Jharal* or type of *Hemitragus* has none, wherefore Mr. Ogilby was especially bound by his own principles not to confound the two.
- 76-77. *Ovis, wild.*—2 Sp. new, *Ammonoides* Nob et *Nahur* Nob; and four tame varieties; viz. the *Hûnia*, *Bâr wâl*, *Câgo* and *Silingia*. H. of 1, 2, is N.; of 3, N.; of 4, 5, 6, C.

CERVIDÆ.

Genus CERVUS—Subgenera.

78. *Cervus*.—1 Sp. Elaphus of the Saul forest, possibly a distinct species, Affinis Nob. Bara Singha of Hindoos. H. T.

79. *Pseudo-cervus* Nob.—1 Sp. Cervus Wallichii Auct. type. Tail nearly obsolete. Horns branched at the base as in Cervus, above as in Rusa, and quadrifurcate, size smaller.

N.B.—Alleged to be identical with Affinis. H. N.

80. *Rucervus* Nob.—Aspect and size mediate between Elaphus and Hippelaphus. Muzzle remarkably pointed. Horns moderate, smooth, pale; one forward basal process on each beam; no median; summit branched as in Elaphus. Canines in males only. N.B.—These subgeneric characters are ours, and are confessedly frailty based, but not less so than the admitted distinctions. The whole family requires reconstruction.

1—Sp. new, Cervus Elaphoïdes Nob. H. T. This is identical with the C. Duvancellii of Cuvier.

81-83. *Rusa*.—Canines in both sexes. Heavily maned. Horns with one basal and one superior process, thick, dark, and pearled.

3.—Sp. new, Jaraya et Nepalensis et Heterocervus Nob.

N. B. Jaraya probably identical with Hippelaphus et Aristotelis. H. T. and L. rarely.

84-86. *Axis*.—3. Sp. 1st Cervus Axis Auct. or Axis Major Nob. 2nd Axis Minor, Lesser spotted Deer Nobis, and 3rd Axis Procinus. Smith. H. T.

87. *Styllocerus*—Sp. new, Ratwah, Nob. The Kaker and Barking Deer of Europeans. Probably identical with the insular type or Cervus Muntjac. H. T. L. and C.

MOSCHIDÆ.

88-90. *Moschus*.—3. Sp. new. Leucogaster, Chrysogaster, et Saturatus, Nob.

N. B.—Saturatus is probably identical with the Moschatus of Linnæus. H. N. and Tibet.

91. *Tragulus*.—1 Sp. new, Mimenoides Nob. Vulgo Bijay. H. T.

SOLIPEDES.

92. *Equus*.—1 Sp. two small tame Himalayan and Trans-Himalayan varieties. H. N. and Tibet.

RODENTIA. MURIDÆ.

- 93-94. *Mus*, *Rats*.—6 Sp. *Rattus* Auct.? *Rattoides* Nob. *Decumanus* Auct. *Decumanoides* Nob. *Nemorivagus*, et *Nitidus*, et *Hydrophilus*, et *Niviventer* Nob. H. C. and N. so far as known.
- 99-102. *Musculus* Nob. *Mice*.—4 Sp. new, *Cervicolor*, *Dumecolus*, *Nipalensis*, et *Dubius* Nob. H. C. and N. so far as known.
- 103-104. *Arvicola*? *Neotoma*.—2 Sp. new, *Pyctoris* et *Myothrix* Nob. also probably the *Hydrophilus* introduced above. H. C. and N.
105. *Arctomys*.—1 Sp. new. *Himalayanus* Nob. H. N. and Tibet.
106. *Rhizomys*.—1 Sp. new, *Badius* Nob. H. L. and C.

SCIURIDÆ.

- 107-109. *Sciurus*.—3 Sp. new, *Macruroides*, *Locria* et *Locroides* Nob. H. L. C. and N. indifferently.
- 110-112. *Sciuropterus*.—3 Sp. new, *Magnificus* et *Chrysotrix*, et *Alboniger*. H, L. C. and N. rarely L.
113. *Hystrix*.—1 Sp. new, *Nipalensis* Nob. *Leucurus*. H. G.
- 114-115. *Lepus*.—2 Sp. new, *Macroetus* et *Oiostolus* Nob. H. of 1st, G. ; or 2nd N. and Tibet.

N. B.—These are the *Indicus* et *Omodius* of former catalogue; but several local names are now dropt.

116. *Lagomys*.—1 Sp. *Nipalensis* Nob. H. N. and Tibet.

In all 116 species, of which probably 55 to 60 are new. Their descriptions, with four or five exceptions only, are to be found in the Journal of Bengal Asiatic Society, and in that of Mr. McClelland. The remaining four or five yet unpublished are forthcoming shortly. The catalogue is considerably enlarged since it was last published in Lin. Trans. A. D. 1838. Some uncertainty still hangs over the intimate structure of the murine animals, but all the rest have been carefully allocated in the modern genera after full examination of their conformation, while their special habitats have been determined upon accurate information.

I have lately seen a critique by Mr. Ogilby of my labours in this department, but I cannot say it is distinguished by much candour. It is well known, that when Mr. Ogilby wrote, several successive catalogues of mine, embodying the improving results of new information, and greater skill in the appreciation of it, existed; and had Mr. Ogilby

consulted the whole of these, *according to their dates*, he might have spared a great part of his censorial remarks. Let Mr. Ogilby consult the very first catalogue, and he will find, that most of his identifications of my so-called new species, with others recorded by authors, had been priorly indicated by myself. Let Mr. Ogilby have patience, and he will still find, that several of these species are really new. With regard to *Semnopithecus*, *Entellus*, *Papio Rhesus*, *Cercopithecus Radia-tus*, *Manis Macrourus*, *Cervus Equinus*, not I, but the late Mr Bennett, is answerable for the errors committed where such there be, as I have letters of his to prove: and so too, for the misappropriation in reference to *Felis Viverrinus*. Of that species, my specimens had reached London before Mr. Heath's, and been seen by Mr. Bennett, who had suggested to me the Viverrine likeness, which I was contending was confined to the head; when to my surprise, for Mr. Bennett was in general singularly fair and courteous, suddenly appeared the description of a novelty ascribed to Mr. Heath. Mr. Gray (apud Hardwicke) had meanwhile justly given the discovery of the species to me, though he retained Mr. Bennett's name for it; but as that name conveyed a false analogy, I have chosen to adhere to my own. In short, Mr. Ogilby's critique is rather too much like a comment on the well-known text, "Woe betide the local researcher, who presumes to judge of his own stores."

Valley of Nipal, Dec. 1841.

Proceedings of the Asiatic Society.

(Thursday Evening, 11th November, 1841.)

The Hon'ble Sir E. RYAN, President, in the Chair.

The Reverend WM. WINCHESTER, Chaplain of Berhampore, was proposed a Member by F. BEAUFORT, Esq. seconded by the Secretary.

Library and Museum.

Read the following Reports submitted by the Curator and Librarian.

The Curator's Report.

SIR,—My report for the month of October will be found to relate chiefly to a valuable donation of Quadraped and Bird skins, procured in the vicinity of Maulmain, which have been presented to the Society by Government, and to another collection of Bird skins from the Himalaya, for which we are indebted to the liberality of Dr. Spry, of the Bengal Medical Service.

The first of these collections contains six skins of Mammalia, pertaining to as many species, and 58 of Birds, which are referrible to 42 species. I have endeavoured to determine the whole series, and shall proceed to notice them in detail, adding such remarks as I conceive may be useful to students of Zoology in this country.

The Mammalia consist of two *Carnivora* and four *Rodentia*, which are as follow:—

1. *Urva cancrivora*, Hodgson, (Journal of the Asiatic Society of Bengal, 1837, p. 562,) or, more recently, *Mesobema cancrivora*, ibid. (Calcutta Journal of Natural History, No. 6, p. 214.)—The specimen has been mounted with considerable difficulty, from the unfortunately decayed condition of the skin, though the hair is uninjured, and its appearance now is fully as good as that of Museum specimens in general. I have also had its skull (which is quite perfect) taken out and cleaned. This, as noticed by Mr. Hodgson, is remarkable for having incomplete bony orbits, which is very rarely the case in the highly natural sub-family to which the animal strictly appertains, namely, the *Viverridæ Herpestidinæ*. I do not myself perceive any peculiar affinity which it is said to bear to the *Guline Mustelidæ*.

2. *Artictis Binturong*, Temminck; *Ictides Ater*, Valenciennes; and a juvenile brown variety, probably the ordinary dress of the young animal, *I. albifrons*, F. Cuvier.—The latter has usually been regarded as the permanent female colouring of the species, but a very old and much injured specimen of the female Binturong in our Museum, which now that the present specimen has been received, I have had the skull and limb-bones taken from, though sufficient to illustrate the fact here stated is retained of its skin, is equally black with the mature male. The Maulmain specimen is little more than half-grown, and retains its deciduary canines: its colour is black, with a grizzled whitish visage, occasioned by each hair having a subterminal yellowish-white annulation, which is likewise the case, more sparingly, on the limbs; while the belly and basal part of the tail underneath are of a dull reddish white, more or less of which, I believe, is permanent; ears white-edged, but the lengthened hair on their posterior surface black. This specimen was also in very bad condition, being much torn and decayed, but the hair is nearly perfect. Its skull has

been taken out, and we have now, therefore, two examples illustrating different ages of the skull of this highly interesting genus. It pertains to the restricted division of *Plantigrada*, which have two true molars on each side of both jaws, posterior to the *carnassier*, or scissor-tooth, a distinction serving, with other characters, to separate them (as a different natural group) from the Badgers and allied forms, which latter, associated with the Weasels and their allies, form another, equally distinct, that might be termed *Subplantigrada*: these have but one true molar in each jaw, posterior to the scissor-tooth; which latter is merely the hindmost of the *false* molars, and, as such, is represented by a deciduary tooth in the young animal, which is never the case with *true* molars. There are some genera in which the scissor-tooth can scarcely be determined except by this test, and the Binturong is one of them. Both divisions here indicated are distinguished from all the other *Carnivora* (Cuv.) by the absence of a *cæcum coli*, wherein they resemble the greater number of *Insectivora* (Cuv.) The absence of a *cæcum* is, indeed, assigned by Baron Cuvier as a character common to the whole of his *Insectivora*; but M. M. Diard and Duvaucel had long previously to the publication of the 2d edition of the *Regne Animal*, noted the existence of this viscus in the genus *Tupaia*, Raffles; * (*Cladobates*, F. Cuv.; *Glisorex*, Blainville; *Hylogale*, Tem.) and Dr. Andrew Smith has recently figured and described the *cæcum* with the other viscera of his genus *Macroschelides* (or *Erinomys*, Blainv.; *Rhynomys*, Lichtenstein): it may be expected to exist likewise in the genus *Gymnura*, Vig. and Horsf. (or *Echinosorex*, Blainv.), and also in the little known genus *Eupleres* of Doyère, figured, not long ago, in the *Annales des Sciences Naturelles*. The restricted *Plantigrada* consist of seven genera, whereof one—the Bears (*Ursus*)—comprises numerous living as well as fossil species, the former of which are distributed over Europe, Asia, the great Malay Islands, the Atlas chain in North Africa, the Andes in South America, and all North America; a fossil species is likewise found in Brazil: of the other six, two are peculiar to Asia, and the rest to America. The former are—the Panda (*Ailurus*, Duvaucel), or ‘Wah’ of Nepâl, chiefly known to inhabit the eastern Himalayas; and the *Binturong* (*Arctictis*, Tem., *Ictides*, Valenciennes), which is also found in Nepâl, and thence southward to Malacca: the latter consist of the Raccoons, (*Procyon*, Storr); the Coati-mondis (*Nasua*, Storr); the Kinkajou (*Cercoleptes*, Illiger); and the Bassary (*Bassaris*, Lichtenstein). Two of them are stated to have prehensile tails, namely, the Kinkajou and the Binturong: in the former of these, however, this organ is prehensile only in a very slight degree, (insomuch that the term is quite inapplicable,) as I am enabled to state from personal observation, having seen a very tame Kinkajou loose in a room; this animal, as it clambered about the chairs, &c. merely pressed its tail occasionally and very slightly against whatever offered, stiffening it throughout its length in a slight downward curve, but never coiling it; but the Binturong, according to native accounts, twists its tail round a branch to give impetus to its spring, and then throws itself on its prey, generally Monkeys (whence its Burmese name of *Myouk kya*, or monkey tiger), and with it falls to the ground. Its head is said to be particularly hard, and that it cannot be killed by blows inflicted on it. “The present specimen,” which is the individual now presented to the Society, “had several blows inflicted on it with a heavy bamboo, but not apparently to its injury: it was shot at the summit of a tree; and the natives say, that this animal is generally seen upon

* Asiatic Researches, vol. xiv, p. 474.

trees, living in the jungles, where it is very seldom observed.”* The crania before me are by no means remarkable for solidity, and indeed that of the specimen referred to is fractured, doubtless from the blows mentioned; and it may be remarked that the tail of this creature has no naked space at its extremity, wherein it resembles those of the American Sajous (*Cebus*, Geoffroy). In the other genera of true *Plantigrada*, except the Bears which have scarcely any tail, this appendage is equally bushy throughout its length, and is always ringed with two shades of colour. Several of these animals have retractile claws, more or less so; as instanced in the Panda and Binturong, and in the Bassary. The last named elegant species has been erroneously approximated to *Paradoxurus*, among the *Viverridæ*, which family has no American representative. The Zoological Society possessed a living specimen at the time I left London, and as this genus is but very little known to most naturalists at present, I may be permitted to mention that it does resemble *Paradoxurus* not a little in external aspect, having the same elongated body, enabling it to spring from bough to bough with extreme lightness and agility, ruddered by its very bushy and squirrel-like tail. Its head resembles that of the Kinkajou, with the same Marten-like ears, and long extensible tongue, which latter is indeed common to the whole group, all of which are great devourers of honey and other sweets: but the Bassary would appear to be also highly predatory, and probably a good deal resembles the Martens in its habits. Its talons are very sharp and retractile; and the fur short and Lemur-like, as in the Kinkajou: colour greyish with a barred tail. What specimens have been obtained have all been brought from Mexico. Such is a slight survey of the group to which the Binturong belongs, and to which certain fossils are likewise referrible, as that figured in Pl. 150, figs. 2, 3, and 4, of the *Ossemens Fossiles* of Baron Cuvier. The *Ictide Dorée* of Mons. F. Cuvier is a veritable *Paradoxurus*.

3. *Pteromys petaurista*, Auct:—being the first well authenticated example of this large dark species which I have seen from the eastward of the Bay of Bengal. It may, therefore, rather than *Pt. nitidus*, be the great Tenasserim species mentioned by the late Dr. Helfer; but it is probable that both inhabit the same forests. The *Pt. Oral* of Lieut. Tickell, elaborately described in the *Calcutta Journal of Natural History*, No. 7, p. 401, would appear to be no other than *Pt. petaurista*.

4. *Sciurus bicolor*, Sparrman.—A very fine specimen. Of this animal, which Dr. McClelland procured examples of in Assam, we are informed by Dr. Horsfield (in *Proc. Zool. Soc.*, for 1839, p. 151), that “individuals agreeing in all particulars with the Assamese specimens have been observed in other parts of India by Dr. Francis (Buchanan) Hamilton and by Dr. Finlayson. The latter forwarded several specimens to the Museum at the India House. The specific character originally constructed by Sparrman, and subsequently adopted by all systematic writers, defines accurately the animal as described by Dr. Hamilton and by Dr. McClelland. Schreber’s figure also agrees with the same; while the animal from Java (represented in Horsfield’s *Zool. Res.*, and indicated as a variety in Fischer’s *Synopsis Mammalium*,) appears to differ from the continental specimens by the variations to which it is subject. It remains, therefore, for further research and observation to determine whether these two varieties may not be specifically distinct, and whether

* Captain McLeod, in *Calcutta Journal of Natural History*, No. 7, p. 458, from information supplied by the Rev. Mr. Barb.

the name of *Assamensis* proposed by Dr. McClelland should not henceforth be applied to the species observed in continental India by himself, and by Hamilton and Finlayson." The present species is nearly allied to *Sc. maximus*, but differs from that animal and its Javanese analogue *Sc. Leschenaultii*, among other respects, by the constancy of its colouring; Dr. McClelland remarking that the description of it which he took was derived from seven or eight specimens, and that among the various individuals he had seen there appeared to be no difference. "All the upper parts are deep and glossy reddish-black, the cheeks and under-parts whitish tinged with fulvous, with two dark spots on the chin. Body fifteen, tail sixteen inches long." Our Museum contains a fine series illustrative of the variations of colour of *Sc. maximus*; and the skulls of both the present and the foregoing species (*Pteromys petaurista*) have been taken out, for purposes of comparison with their proximate allies. That of *Sc. bicolor* is much smaller, and otherwise differs considerably from the skull of *Sc. maximus*.

5. *Sciurus* ——— ?—Undetermined, but, I believe, a species which I have seen before, in England. Dr. Spry possesses a living specimen of it from Arracan. Length 10 or 11 inches, the tail, with its hair, 1 foot or nearly so; ears slightly tufted with whitish, denoting the hyemal dress. Colour grizzled fulvous-brown, purer fulvous on the sides of the neck, and less so on the head and croup; fore-limbs and hind feet ashy, the tail slender and black-tipped, and the under-parts and inside of the limbs whitish-grey; whiskers black and strong. This species is very common along the Tenasserim coast.

6. *Rhizomys cinereus*, McClelland, (Calcutta Journal of Natural History, No. 7, p. 496,) genus *Nyctocleptes* of Temminck.—The researches of naturalists in this part of the world are fast bringing to light additional species of this curious genus, which, till lately, was only known to contain the *Rh. Sumatrensis*, Gray, (or *Mus Sumatrensis*, Raffles,* *Spalax Javanus*, Cuvier, and *Nyctocleptes*—?, Temminck,) and the *Rh. Sinensis*, well figured in one of the late Major General Hardwicke's drawings, edited and named by Mr. Gray. The latter species has been discovered to inhabit the Phillippine Islands by Mr. Cumming—(vide *Proc. Zool. Soc.*, 1840, p. 62.) A third has been made known by Mr. Hodgson as an inhabitant of Nepâl (*Rh. badius*, Hodgson); and the present species is described to me by Mr. Barb to be the smaller of two inhabiting the Tenasserim provinces. Moreover, two if not three species, according to Dr. McClelland, are contained in a zoological collection of much interest, recently made in Assam by Mr. H. Walker, and which is now under that gentleman's investigation. An additional interesting notice of the Nepâlese species has been published by Mr. Hodgson (in *Calcutta Journal of Natural History*, No. 7, p. 411). The fact there stated of this creature's tameness when first caught, and not offering to bite with its formidable front-teeth, is observable in even most other Rodents, though the genera *Mus* and *Sciurus* form conspicuous exceptions to it: the large Water Vole of Europe may be handled with perfect impunity. With respect to the food of the species of *Rhizomys*, which is known to consist of roots, and especially those of bamboo, I would call attention to an observation of the Rev.

* Dr. McClelland inclines to doubt the identification of Mr. Gray's animal with that of Sir Stamford Raffles, and which is figured in one of the late Colonel Farquarson's drawings, preserved in the Museum of the London Asiatic Society, where I have seen it. vide *Loc. Cit.*

Mr. Bree, relative to the common Rat (*Mus decumanus*), to suggest the probability of the same remarkable mode of feeding being resorted to in the present instance, which the great power of the jaws and strength of the gnawing teeth seem to render very likely. Mr. Bree describes the attacks of the Rats upon his "young oaks in a plantation near a brook and small pond. They gnaw the tree off just below the ground; sometimes nearly as level as if it had been cut with a saw. Young trees nearly as thick as my wrist," he states, "have been served in this way; and I have been quite astonished how the Rats could cut them through so completely. The fact is, the Rat begins his operations underground, and eats upwards as far as he finds the wood soft enough for his purpose, which is just below the surface: the consequence is, that the tree will often remain erect, and appear to the eye as if nothing had happened to it; but of course it throws out no leaves in the spring, and, on taking hold of it, you find it loose, and ready to come up with a touch."* The same has been observed of young willows growing in a somewhat marshy soil, and been referred, as I believe erroneously, to the operations of the Water Vole. According to the information supplied to Captain McLeod by Mr. Barh, the *Pouè* (*Rhizomys cinereus*) is an animal rarely seen, and is found in the more hilly parts of the country. The Burmese eat the animal when they can catch it. It burrows very rapidly, and spends the day time in holes, living on the roots of the bamboo generally, but towards night-fall it comes out and amuses itself by cutting the bamboo down, which it does very expeditiously. It does not take to the water at all."† Mr. Hodgson was informed that the Nepalese species constructed burrows under the roots of trees or shrubs, and that they may be taken almost as easily as a domestic animal, from their extraordinary boldness or apathy. An interesting notice follows, of an individual which that naturalist possessed alive.

Of the foregoing six Quadrupeds, the *Urva*, the two Squirrels, and the *Rhizomys*, are new to our Museum; the *Pteromys* was represented only by an imperfect skin, noticed in my last report; and the Binturong is equally acceptable, as replacing, till we can get a still better one, the very old and shabby specimen already mentioned.

Of Birds, there are two species of the restricted order *Scansores*, or Parrots; viz.

1. *Palæornis Pondicerianus*, Vigors, or *Psittacus mystaceus* and *bimaculatus*, Shaw; which, though procurable in any number in Calcutta, is new to our Museum; and

2. *Psittacula vernalis*, Swainson.—The small Crimson-rumped Lorikeet, which is also a common bird in India. Both these species, and the former especially, as I am informed by Mr. Barh, are very common on the Tenasserim coast, where also are found four other species of *Palæornis*, namely, *P. Alexandri*, *torquatus*, *Bengalensis*, and *flavitorquis*.

The only Raptorial species sent is—

3. *Athene cuculoides*; *Noctua cuculoides*, Vigors.—Which is also very common, and much persecuted, and even frequently killed by the Crows (*Corvus splendens*, Vieillot, or better named *C. impudicus*, Buchanan; the common Crow of India).

Of the order *Insectores*, and first great division of it—*Heterogenes*, I find, among the *Syndactyli*, technically so styled, two species of *Buceridae*, three of *Halcyonidae*, and two of *Meropidae*, viz.

* Gardener's Magazine, vol. vii. p. 235, and Magazine of Natural History, vol. vii. p. 456.

† Calcutta Journal of Natural History, No. 7, p. 457.

‡ Ibid. p. 411.

4. *Buceros ruficollis*, Vieillot.—Mr. Barb assures me, that there are two races, or perhaps species, of this Hornbill, which differ only in the colour of the naked skin of the throat and around the eyes, which in one is of a beautiful blue, and in the other an equally rich yellow. Both are very common, associating in flocks of a dozen or twenty birds, but the two do not mingle in the same flock. The *B. Nipalensis* (Hodgson) was not recognised by Mr. Barb as an inhabitant of Tenasserim.

5. *B. leucogaster* ? Nobis, n. s. ? Length about two feet, of wing from bend $9\frac{1}{2}$ inches, tail the same; beak $3\frac{1}{2}$ in. long, and, with casque, 2 inches deep; the latter sub-carinated, and narrowing and diminishing anteriorly to where it terminates, but little abruptly, beyond the middle of the upper mandible, as if a young bird (which Mr. Barb assures me it is not). All the upper parts wholly black glossed with green, except the tips of the wing-primaries and secondaries, and of the tail feathers, exclusive of the uropygial pair, which are white; belly and thighs also white, as is likewise the inside of the shoulders of the wings: coronal and occipital feathers elongated. Beak yellowish white; and tarse greenish. This species associates in large flocks, and is even more common than the last. A still smaller black species, with a similar casque, and the common Indian *B. Malabaricus*, are stated by Mr. Barb to be also common in Tenasserim; while the great *B. Homrai*, Hodgson, is likewise found there, but more sparingly, and differs from the rest in never flocking but keeping in pairs, and avoiding human habitations. The *B. Rhinoceros* was not recognised by Mr. Barb as an inhabitant of Tenasserim.

6. *Alcedo Bengalensis*, an adult and two young specimens.—This common Indian species is contained in a collection made by Dr. Cantor in Chusan. It abounds in Tenasserim.

7. *Halcyon Capensis*.

8. *H.* ——— ?—The Goorial of the Sunderbunds of Bengal.

9. *H. Coromandus*, *Alcedo Coromandus*, Sonnerat.—The *H. atricapillus* and *H. Smyrnensis* are likewise recognised by Mr. Barb, as being, with the three former species, common in Tenasserim; and all are stated by him to be very piscivorous, which is a fact not generally known of the restricted Halcyons. *H. rudis*, was observed by Mr. Barb at Rangoon.

10. *Coracias affinis*, McClelland and Horsfield (*Proc. Zool. Soc.*, 1839, p. 164.)—I am informed that this bird is not unfrequent in Bengal.

11. *Bucia Athertonii*: *B. Nipalensis*, Hodgson; *Nyctiornis Athertonii*, Swainson; *Merops Athertonii*, Jardine and Selby; *M. cyanopterus*, Jerdon (*Madras Journal*, No. 27, p. 228.)—Both this species and *B. amictus* are stated by Mr. Barb to occur, though rarely, on the Tenasserim coast. The latter is, I believe, more frequent in the Malay peninsula. The *Coracias Indica*, *Merops Indicus*, and *M. Sumatranus*, are also recognised by Mr. Barb as inhabitants of Tenasserim. *Upupa Epops* is very abundant.

Among the *Zygodactyli*, technically so denominated, I find in the collection

12. *Bucco Indicus* and *rubricapillus*, Latham, *B. Phillippensis* and *flavicollis*, Vieillot. A very abundant species in Bengal, and, I believe, throughout the Indian Peninsula. It is equally common in Tenasserim, where, however, the *B. cyanops*, so plentiful in Bengal, was not observed by Mr. Barb.

13. *Picus occipitalis*, Vigors.

14. *P. squamatus*, Vigors; *P. dimidiatus*, Gray, not of Temminck.—Immature plumage, having the crown and occiput more scarlet than in the adult, the breast a little streaky, and the under-parts marked but obscurely. This and the preceding species, which are nearly allied to the two green Woodpeckers of Europe, are included with them in the subgeneric division *Gecinus* of Boié.

15. *P. tiga*, Horsfield, *Chrysonotus tridactylus*, Swainson.—The Indian Three-toed Woodpecker. This bird only differs in plumage from the *P. Shorii*, Vigors, as figured in Gould's Century, by wanting the defined brown markings on the throat and fore neck; and as there is some tinge of the same about the throat, and on the sides of the neck, of the present specimen, I incline to consider them identical. This three-toed species is not particularly allied to the three-toed Woodpeckers of the North, which essentially pertain to quite a different section of the genus—the *Dendrocopus*, Swainson; but it closely approximates to the common *P. Bengalensis*, which has a minute inner back toe, and is intermediate in plumage to that species and another and larger Woodpecker in our collection, (the *P. Sultaneus*, Hodgson,) which has a proportionately much larger beak, and a full-sized fourth toe; from the latter, the only marked difference of plumage consists in the three-toed species having the hind neck black (as in *P. Bengalensis*,) instead of white; while from the other it differs more conspicuously by its crimson rump, and the uniform golden orange colour of the wings externally. All three are stated by Mr. Barb to inhabit the Tenasserim provinces.

16. *P. badius*, Raffles; *P. brachyurus*, Vieillot and Wagler; *P. rufus*, Gray, not of Wagler.

17. *P. (Meiglyptes*, Sw.,) *poioccephalus*, Temminck: an adult male and young female specimen. Common in Tenasserim, as are all the other Woodpeckers which have been mentioned.

18. *Oxylophus* — ?—Undetermined. I believe, a well known species, but the name of which I have not been able to ascertain. Length 17 inch, of wing from bend $6\frac{1}{2}$ inches, and tail 10 inches. Beak $1\frac{1}{3}$ inch from forehead, and tarse posteriorly 1 inch. Coronal feathers elongated. Upper parts blackish-brown having a green shine, except a half collar of white at the back of the neck; under-parts white, tinged with rufous on the throat, fore-neck, and under surface of the wings anteriorly; lower tail-coverts dusky-black; primary and secondary quills and their coverts deep ferrugineous, the tail feathers slightly tipped with whitish. Beak blackish horn-colour; and legs greenish plumbeous. This bird is common in Tenasserim, where the *O. edolius*, which is numerous in Bengal, was not observed by Mr. Barb. It would appear to be nearly allied to *O. Coromandus*.

19. *Phænicophæus longicaudatus* ? Nobis, n. s ?—Length $23\frac{1}{2}$ inches, of wing from bend 6 inches, and middle tail feathers $15\frac{1}{2}$ inches, the outermost $5\frac{1}{4}$ inches, and the rest evenly graduating. Beak $1\frac{1}{8}$ inch from forehead, and tarse posteriorly $1\frac{1}{4}$ inch. General colour dark greenish-grey; the wings and tail shining dark-green, with a white tip to each tail-feather; front of the neck and breast paler, passing into whitish on the throat and immediately around the naked space encircling the eye, these whitish feathers having dark shafts, which terminate in a slightly prolonged hair-like bristle; small anterior portion of the lores black. Beak bright-green, and legs dusky. A common species in Tenasserim, and always seen in pairs. The *Centropus pyrrhopterus* is also very common there, as in India generally.

Of *Heterodactyli*, this collection contains only

20. *Trogon Malabaricus*, Gould, *Tr. fasciatus*, Gmelin, *Tr. Kasumba*, Raffles, *Tr. Blonda*, Tem.—An immature male, being the first specimen of this gorgeous genus in our Museum. It is remarkable that the Trogons differ from all other yoke-footed birds (or which have two toes directed forwards and two backwards) in the circumstance of the ordinary inner fore toe being reversed, instead of the outer; in consequence of which, that which corresponds to the middle front toe of the generality of the class (or such as have three toes directed forwards) becomes the inner of the two anteriorly directed toes, instead of the outer as usual, and the ordinary back toe becomes the outer, instead of the inner, of those behind. The *Trogon Malabaricus* is common in Tenasserim.

Among the *Cantrices*, or second grand division of *Insessores* (which have the general organization of singing birds, whether or not they happen to sing), the following species occur:—

21. *Pica (Dendrocitta) vagabunda*, Gould.—Three young specimens. A common species, as in India; but *D. Sinensis* not recognized.

22. *Ianthocincla leucolophos*?, var.; or perhaps a very closely allied species; differing only in having the whole back, wings, sides, vent, and lower tail-coverts ferruginous, which colour is usually confined to the nape and sides of the neck, passing downward to cross the breast; while the white of the under parts, also, of the present bird, instead of abruptly terminating at the lower part of the breast, is continued down the middle of the belly. Also common, occurring in considerable flocks.

23. *Kitta venatorius*, Gray and Hardwicke.—Two adult and three young specimens: considered to be a rare species. The irides are bright red.

24. *Dicrurus retifer*, Vieillot.—Three specimens, but moulting their long exterior tail feathers. This shewy bird is abundant in Tenasserim, as are also *D. balicassius*, a smaller species nearly allied to this, and *D. viridescens*? (*Edolius viridescens*, Gould); but the elegant *D. krishna*, which I observe to be common in the vicinity of Calcutta, was unknown to Mr. Barb.

25. *Lamprotornis chalibeus*, Horsfield.—Common.

26. *Graucalus Papuensis*.

27. *Eurylaimus nasutus*, Tem.; *Cymbirhynchus nasutus*, Vigors.—Two specimens; being the only species of *Eurylaimus* observed by Mr. Barb. The beak and eyes are very beautiful blue, the former fading within a day or two after death. It is common in watery situations, and suspends its nearly globular nest, which is constructed of small twigs, from the branches of trees growing directly out of the water; the eggs are four in number, and pale spotless blue.

28. *Muscipeta Indica*, Stephens, *M. castanea*, Temmiuck.—Female.

29. *Muscicapa cærulea*, Vieillot, *M. occipitalis*, Vigors; female: which is the *M. cæruleocephala*, Sykes.

30. *Pitta brachyura*, Auct.—Two specimens.

31. *P. melanocephala*, Wagler.

32. *P. gigas*, Temminck.—Apparently in nestling plumage. All these birds are common in Tenasserim.

33. *Oriolus melanocephalus*, Linn.—Three specimens.

34. *O. Chinensis*, Gmelin.—Two specimens.—
 35. *Chloropsis Malabaricus*, Jardine and Selby.
 36. *Cinnyris Vigorsii*, Sykes.—Being a new locality, I believe, for this beautiful little species. It is common in Tenasserim.

37. *Anthreptes rectirostris* : *Cinnyris rectirostris*, auct; *C. elegans*, Vieillot.

The remainder consist of a Pigeon, a Jungle Fowl, two Storks, and a Duck; viz.

38. *Carpophaga ænea*: besides which, the *Columbæ (Turtur) Javanica* and *tigrina*, and *Vinago bicincta* (Jerdon) and *V. sphenura*, are recognised by Mr. Barb as inhabitants of the same region.

39. *Gallus pseudhermaphroditus*, Nobis, n. s. ?—A very singular bird, which, if I was not positively assured was a male in normal plumage, I should have suspected to be either an individual of mingled sex, or possibly an aged male; for that it is not a female in partially masculine attire is evident from the size of its comb and wattles, and especially of its spurs. Size of an English game cock, or larger than the male *G. Bankivus*, having much stouter legs, the spurs of which are $1\frac{1}{2}$ inch long; comb and wattles as in the *G. Bankivus*, but the former more entire towards the front (possibly a mere individual diversity): the tail is that of a cock bird of this genus, but scarcely more developed than in the *Euplocomi* (as *Eu. albocristatus*); in other respects the plumage is altogether that of an ordinary brown hen, having a redder cast than in the female *G. Bankivus*, especially on the wings; tail coloured as in an ordinary male. Length about 2 feet, of which the middle tail feathers occupy 10 inches, wing from hind 9 inches, and tarse behind, to hack toe, $2\frac{3}{4}$ inches. I am informed that this species is never clad in the usual bright plumage of the other male birds of its genus.

40. *Ciconia leucocephala*, *Ardea leucocephala*, Auctorum; *Ciconia umbellata*, Wagler.

41. *C. nudifrons*, Jerdon.—The Bald-fronted Adjutant, which I observe to associate with the common Bengal species about Calcutta, where, however, it is comparatively rare. The present specimen is young, and has some lengthened occipital feathers, which seem to disappear gradually with age. Our Museum contains a very fine specimen of the adult of this species.

42. *Microcygna girra*.

Besides these 42 species sent, 14 of which are new to our Museum, and such as have been mentioned with their congeners as inhabitants of the Tenasserim provinces, the following have been recognised in our Museum by Mr. Barb, as species more or less common in the same region: *Milvus Cheele*, *Cercus melanoleucos*, *Gracula religiosa*, *Sturnus contra*, *Pastor cinereus* (Jerdon), *P. tristis*, *P. cristatellus*, *Parus monticolus*, *Copsychus saularis*, *C. macrourus*, *Phanicura fuliginosa*, *Cryptolopha poiocephala*, *Rhipidura Albofrontata*, *Spermestes melanocephalus*, *Tantalus leucocephalus*, *Ibis papillosus*, *Pluvianus Goensis*, *Rhynchops flavirostris*, and *Dendrocygnus awsurree*.

I now pass to the Himalayan collection of Bird skins, from which Dr. Spry has kindly permitted me to select what species were new to the Museum, and for which I have exchanged certain duplicates that were not required. Our acquisitions this way consist of

1. *Palæornis schisticeps*? mentioned in the catalogue of Dr. Royle's birds: size of *P. torquatus*, and nearly allied to *P. Bengalensis*, but having a dull lavender-coloured

head, and black chin and nuchal ring bordering the lavender tint. General colour of the upper parts vivid green, a little paler underneath, and not yellowish as in *P. Bengalen-sis*, but tinged about the nape with verditer; maroon wing-spot as in *P. Bengalensis*; and tail wholly yellow underneath, the two middle feathers green above near the base, then bright blue, and the terminal third yellow; the other tail feathers all yellow on the inner web and tip, having the rest of the outer web green. Upper mandible bright vermillion as far as the notch, its tip and the whole lower mandible yellowish-white; feet as usual. Length 16 inches, of which the tail occupies $9\frac{1}{2}$ inches, its middle pair of feathers reaching $2\frac{3}{4}$ inches beyond the next pair; wing from bend $6\frac{1}{4}$ inches, and tarse $\frac{1}{4}$ inch.

2. *Picus squamatus*.—Female; having the crown and nape black instead of red.

3. *P. Himalayanus*, Jardine and Selby; an immature female.

4. *P. brunnifrons*, Gould and Vigors. Male and female. The collection contained four specimens of this species.

5. *Myophonus Temminckii*.—One of seven specimens.

6. *Turdus viscivorus*.—The European Missel Thrush, one of three specimens, and selected for the purpose of shewing a veritable Himalayan example of this well known bird.

7. *Petrocincla erythrogastra*; *Turdus erythrogaster*, Vigors.—A bad specimen, but we had previously only the female of this fine species, of which the present collection contains also an example.

8. *Orocetes cinclorhyncha*, G. Gray.—Examples of the summer and winter dress of this bird, selected from ten specimens; the whole of which according in their plumage, it may be presumed that there is no sexual diversity of colouring, as might be suspected from its near affinity to the Redstarts. The only seasonal difference consists in the feathers being slightly margined in winter with brownish on the back, and the blue coronal feathers with dusky. The Museum contains an example of this bird in nestling plumage.

9. *Cinclus Pallasii*, Auct.—The Himalayan Dipper, adult and young. A welcome addition to our collection, but the young bird especially is in very unsatisfactory condition.

10. *Ænicura maculata*. One of three specimens, and selected from its appearing to present the opposite sex to that previously in the Museum.

11. *Muscipeta paradisea*. Female. A bad specimen, but which will serve to fill the place of this species until better examples of both sexes can be procured.

12. *Lanius erythronotus*.—One of two specimens.

13. *L. Hardwickii*.—Both these species were labelled "Indian Mocking bird." Several of the Shrikes have been frequently stated to repeat the notes of other birds with much facility.

14. *Coccothraustes icterioides*. Female. The sombre plumage of this sex was wanting in our Museum, where, however, there is a fine male, and the present collection contains two other males.

15. *Columba leuconota*, Vigors.

16. *Lophophorus Impeyanus*.—Male and female; the collection containing five females and four males of this resplendent bird.

17. *Phasianus Wallichii*: *Lophophorus Wallichii*, Hardwicke; *Ph. Stacei*, Vigors and Gould.—Male and female; of which species, four males and two females were sent.

The remainder of this collection consists of *Alcedo Bengalensis*, *Bucco grandis* (2), *Pica* (*Cyanocorax*) *erythrorhynchos* (2), *P.* (*Dendrocitta*) *Sinensis*, *Garrulus gularis* (5), *Nucifraga hemispila* (3), *Ianthocincla variegata*, *Oriolus aureus*, *Muscicapa cærulea*, *Phenicornis brevirostris* (3), *Euplocomus albocristatus* (2), *Eupl. Pucrasia*, *Tragopan Hastingsii*, *Francolinus vulgaris* (3), and *Perdix Chukar* (2).

I have also to acknowledge the donation of a fresh Chinese Lory (*Lorius Sinensis*) from P. Humphrey, Esq., and of a living specimen of a Hawk (*Elanus melanopterus*), in immature plumage, from W. Frith, Esq.

The following species of Birds have been procured in the neighbourhood :—

1. *Milvus Cheele*.—Female.
2. *Strix flammea*.—Male.
3. *Halcyon* —?—The Goorial, male.
4. *Coracias Indica*.—Male.
5. *Merops Indicus*.—Male.
6. *Bucco cyanops*.—Two specimens, males.
7. *B. Indicus*. Two specimens, males.
8. *Picus Bengalensis*.—Male.
9. *P. Macei*.—Male.
10. *Oxylophus edolius*.—First plumage.
11. *Dicrurus Crishna*. (*Edolius Crishua*, Gould). Female.
12. *Pastor cinereus* (Jerdon).—Male and female.
13. *Iora tiphia*.—Young male.
14. *Lanius Collurio?* *verus*.—Young male.
15. *Hæmatornis Caffer*.—Two males.
16. *Copsychus Saularis*.—Male.
17. *Geocichla citrina*.—Male.
18. *Oriolus melanocephalus*.—Two males and a female, illustrating different states of plumage.
19. *O.* — ? n. s. ?—Female; having no black whatever about the visage. This specimen is now alive in a cage.
20. *Ceblepyris melaschistos*; *Volvocivora melaschistos*, Hodgson: female.
21. *Cinnyris sola*.—Male, female, and young.

All the above (save the living Oriole) have been examined internally, the sternal apparatus of the greater number prepared, and minute descriptions have been taken of them in the recent state, noting the fugitive colours of the feet and other naked parts, that of the iris, &c. On dissecting the Barbets, I found a very close approximation in general structure to the Toucans of South America, much more than to the Woodpeckers, in immediate proximity to which latter the Barbets have been always arranged: excepting the bill and tongue, the internal conformation of the Barbets seems to be altogether that of the Toucan, even to the singular character of the imperfection of the clavicles, which do not join to form a *furcula* (or ‘merry thought’) as in other birds, but exist as small dagger-shaped bones, about half their ordinary length; nor do the bill and tongue of the Barbets possess any resemblance to those of the Woodpeckers, as obvious enough in the instance of the former, while the tongue is merely a flattened lamina of the ordinary shape and size, a little furcate at the tip, being more distinctly so in *B. cyanops*, and less noticeably in the small *B. In-*

dicus. The African genus *Indicator*,* on the other hand, which has been currently classed with the Cuckoos, appertains strictly to the natural family *Picidæ*. The only other birds I know of, wherein the clavicles do not join and form a *furcula*, besides the *Struthionidæ*, properly so called, in which they are curiously modified, are the Touracocs (*Corythaix*) of Africa (and doubtless the allied genera *Musophaga*, *Chizæris*, and *Colius*), in three different species of which I have found the clavicles to be separate, though all but joined; and various *Psittacidæ*, in which they are altogether wanting. They vary, in proportionate length in different species of Toucan (*Rhamphastos*), but have been figured by l'Herminier as united in the closely allied *Pteroglossus Aricari*.

In the class of Mammalia, we are indebted to Lieutenant Tickell for two fine pairs of Deer-antlers, belonging respectively to the Sambur (*Cervus Hippelaphus*), and Axis (*C. Axis*).

In that of Reptiles, I have procured three specimens respectively of two species of Snake, and some examples of an *Anolis* common in the neighbourhood. The former are—

Psammophis cerasogaster, Cantor:—which is considered by that naturalist rather an uncommon species, and is new to the Museum; and

Tropidonotus dora, Cantor; *Dora* of Russell; *Coluber Dora*, Daudin.

Osteology.—The skeleton of the Rhinoceros, noticed in my previous report, has been remounted, and is again in its place. It is unfortunately deficient in the digital bones of all four extremities, in the sternal pieces, the penultimate pair of ribs, and one of the diminutive last pair. We possess, however, a skeleton foot of a Rhinoceros, presented to the Society by Dr. Pearson.

A skeleton of a Bat, *Scotophilus castaneus*, has also been prepared and set up, and also the skulls of the following species of *Vespertilionidæ*:—

Scotophilus castaneus.

Taphozous longimanus.

T. brevicaudus, Nobis, n. s.

Megaderma tyra, and

Dysopus plicatus (?).

Also skulls of

Canis aureus.

Vulpes montanus.

Urva Nipalensis.

Paradoxurus typus.

Arctictis Binturong.—Two specimens.

Pteronys petaurista.

Sciurus maximus.

Sciurus bicolor.

Sciurus—? Undetermined.

Mus—? Undetermined.

Gerbillus Indicus.

Georychus fuscocapillus, Nobis, n. s.

* Since writing this, I have met with a Himalayan species of true *Honeyguide*—*Indicator xanthonotus*, Nobis.

The skeleton of the Hoolock, or White-browed Gibbon, is prepared, and quite ready for mounting, as also that of a Crow (*Corvus splendens*); and skeletons of two species of Barbet, of a Snipe (*Scolopax heterura*), and of *Cinnyris Sola*, are in course of preparation. In addition to the sternal apparatus of most of the birds already mentioned, as having been procured in the recent state, we are indebted to Mr. Bouchez, for that of a Monaul (*Lophophorus Impeyanus*), that of a rare Hawk (*Hyptiopus lophotes*), and of one of the Australian broad-tailed Parroquets (*Platycercus eximius*).

In the Botanical Department of the Museum, I have nothing to report.

The Librarian's Report.

SIR,—The report I have the honour to submit to the Committee for the months of September and October is as follows:—

I received on the 27th September 23 gems from the Secretary, which were deposited in the medal cabinet.

Almost all the books in bad condition, a list of which I sometime ago laid before the Committee, have been rebound or repaired.

Though the expense incurred is great, the preservation of so many valuable works for the use of the Members of the Society and the community at large, will be more than adequate compensation.

A great number of duplicates have been selected from the shelves. Should it appear desirable to the Committee, these might be sold or exchanged for others, and as many of them are valuable books, perhaps the Members of the Society might wish to take some of them and give others in their stead.

The classification of the catalogue has been completed in the month of September, a copy of which is nearly ready for the print, and the arrangement of the library has been also finished.

I add a paper containing a general view of the classification of the catalogue.

The classification was, on the whole, made according to the plan I had the pleasure of proposing to the Committee. Such deviations from it only were thought advisable which bore a stricter correspondence with the principles according to which the classification was framed; and I may here mention it generally, that in the progress of the arrangement those principles were more and more rigidly adhered to, as this was found not only in more accordance with the natural divisions of science, but likewise better adapted to satisfy the demands of convenience.

The alterations alluded to are chiefly the following:—

There are at present only two main divisions, one containing the classic literature, the other that of the modern languages.

The science of medicine has found its more congenial place at the end of the natural sciences, instead of being connected with the three first divisions.

An alphabetical list of the titles of the books and of the names of the authors will be added to the catalogue, so that in finding the books every facility will be afforded to those who wish to avail themselves of the advantages of the library.

With regard to the collection I would remark, that, as it has been made mostly by valuable donations from generous individuals desirous of advancing the interests of the Society, no arrangement has been made to obtain all the standard works relating to each branch of knowledge, so that there are necessarily many deficiencies in the libra-

ry, which it seems desirable to supply. It would perhaps be well first to complete those divisions of the library which relate to natural science in general, and likewise those which refer to the history, civilization, languages, &c. of Asia.

I beg to submit to the Committee, if it be desirable, that all the books at present out, should be returned, at least for a short period, as the arrangement of the library cannot be completed till their titles and contents are ascertained. At the same time I would ask, if it be not advisable to call in the books once a year for the space of five or six days, that it may be known, whether they require repairing or any of them have been lost.

2d November, 1841.

I have the honor to be, Sir,

Your most obedient servant,

E. ROER.

Ordered,—That the three propositions,

1st. That the duplicate copies selected be either sold or exchanged;

2d. That the books now lent out be returned for a short time; and

3d. That the books be called in once a year for examination, submitted by the Librarian, be referred to the Committee of Papers.

A.

CLASSIC LITERATURE.

A. Greek Literature.

1. Philosophy.

2. History.

3. Geography.

4. Miscellaneous.

B. Roman Literature.

B.

Modern Literature, from the commencement of the Christian era to the present age.

I. Theology.

A. Polytheism.

a. Special forms of Polytheism.

1. Religion of Egypt.

2. ——— of the Greeks.

3. ——— of Zoroaster.

4. Brahmanism.

5. Buddhism.

6. Religion of Confucius.

b. Polytheism in general.

B. Monotheism.

a. Judaism.

b. Christianity.

1. Holy Scriptures and parts.

2. Biblical Criticism and Interpretation.

3. History of the Church.

4. Miscellaneous Works.

c. Mahommedanism.

11. Law and Jurisprudence.

- III. Philosophy.
 - IV. Mathematics.
 - V. Natural Sciences.
 - A. Natural Science in general.
 - a. History.
 - b. Journals and Cyclopædical Works.
 - B. Branches of Natural Science.
 - a. Natural Philosophy.
 - 1. Natural Philosophy in general.
 - 2. The branches of Natural Philosophy.
 - A. Pneumatics.
 - B. Hydrostatics.
 - j. Crystallography.
 - 8. Sound.
 - r. Heat.
 - y. Light.
 - y. Electricity.
 - a. Magnetism.
 - b. Astronomy.
 - c. Geology.
 - d. Chemistry.
 - e. Natural History, and Natural History in general.
 - f. Branches of Natural History.
 - 1. Mineralogy.
 - 2. Botany.
 - 3. Zoology.
 - a. Zoology in general.
 - b. Branches of Zoology.
 - f. Anatomy.
 - g. Physiology.
 - h. Medical Science.
 - 1. History of Medicine.
 - 2. Pathology.
 - 3. Therapeutics.
 - 4. Materia Medica.
- VI. Applications and Arts.
- VII. Historic Science.
- A. History.
 - a. General History.
 - 1. Chronology, Dictionaries, Journals, etc
 - 2. Universal History.
 - b. Special History.
 - 1. Of Antiquity.
 - 2. Of the Asiatic Empires.
- B. Of Greece.
- j. Of Rome.

- r. Of the Middle Ages and of Modern Times.
- A. Of the Occidental Empires.
- B. Of the Oriental Empires.
 - a. General History of the East.
 - b. Special History of the East.
 - Of the Huns.
 - Of the Mohammedan Empires.
 - 1. Of the Arabs.
 - 2. Of the Moguls.
 - 3. Of the Sultauns of Egypt.
 - 4. Of the Turks.
 - 5. Of Persia.
 - 6. Of Hindoostan.
 - 7. Of China and Japan.
- C. Of America.
- D. Of Africa.
- B. Biography.
- C. Voyages and Travels.
- A. History of Travels, Voyages round the World, and Collections of Travels.
- B. Travels in various parts of the World.
 - a. Travels in Europe.
 - 1. To various parts in Europe.
 - 2. To special parts of Europe.
 - b. Travels in Asia.
 - 1. Travels in Asia in general.
 - 2. Travels in Western Asia.
 - 3. Travels in Central Asia.
 - 4. Travels in Eastern Asia.
- S. Travels in India, and Voyages to India.
 - c. Travels in Africa.
 - d. Travels in America.
 - e. Travels to the Polynesian Ocean.
- C. Geography and Statistics.
 - a. General Geography.
 - b. Special Geography.
 - 1. Geography of Europe.
 - 2. ——— of Asia.
 - 3. ——— of Africa.
 - 4. ——— of America.
 - 5. ——— of Polynesia.
- E. Archæology and Antiquities.
- VIII. Languages.
 - A. Grammar.
 - a. Comparative Grammar.
 - 1. Grammar of European Languages.
 - 2. Grammar of Oriental Languages.

- d. Of the Semitic Languages.
 - B. Caucasian Languages.
Of Indian Languages.
 - 1. Of the Sanscrit.
 - 2. Of the Pali.
 - 3. Of the Modern Indian Languages.
 - S. Of the Chinese Language.
 - B. Dictionaries.
 - C. Critics and Interpretations.
 - D. Literature.
 - E. Catalogues.
 - IX. Miscellaneous Works.
 - A. Works.
 - B. Journals, Encyclopædias, etc.
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Read two letters, dated the 29th September and 20th October last, from Mr. Secretary Bushby, the first transmitting a communication from Mr. A. T. Christie, late of the Medical Service, Madras Establishment, reporting his Geological Researches in that part of India, and the second transmitting copies of Papers by Captain G. B. Tremenhære, Executive Engineer, Tenasserim Division, on the Tin Grounds and Manganese Beds of the Mergui Province.

Read also two letters from Mr. H. Cope, dated the 4th and 5th October last, on the subject of the investigation of the Himalyan Lichens.

Read letter from Mr. J. G. Bruce, of 18th October 1841, on the subject of the Nurma Cotton produced in Malwa, elicited with reference to the remarks of Mr. H. Piddington, and noticed in a recent number of the Journal.

Ordered,—That the foregoing Papers be made over to the Secretary in his capacity of Editor, for publication in early numbers of the Journal of the Asiatic Society.

Read letter from Captain S. R. Tickell, with sketches of Idols.

Read letter from Baboo Ramcomul Sen, of 3d November 1841, with a number of Copper Coins, presented to the Asiatic Society by Dr. R. Stuart of the Native Hospital, who, in sending them, writes: "I have much pleasure in forwarding the accompanying Copper Coins, which were given to me as curiosities. When they are really old, I know they possess much value in the eyes of such as wish to be thought antiquarians; how far those I send may be deemed valuable, I do not pretend to judge."

Read letter from J. H. Batten, Esq. of 4th October 1841, forwarding some "Loose Leaves" from Thibet, brought down by Deboo, Putwaree of the Juwater Pars (one of the chief Bhotias), who got them from some man in Heoondes (the Thibet name of Kemaoon.)

These "loose leaves" having been submitted for Report to Mr. Csoma, that gentleman writes,

"I beg to inform you that the 24 loose leaves (of blue paper, with Tib. capital character on, written with orpiment, under the following numbers of leaves: 5, 6, 8, 10,

21, 40, 46, 53, 58, 60, 65, 68, 86, 92, 93, 95, 96, 101, 102, 104, 113, 117, 128 and 131,) received from Almora, are the parts of some extracts of some Tāntrika works, containing some short address or prayers to Shákya, to Vajra Pani, and to other Saints or Divinities for instruction how to obtain prosperity and future beatitude, and how to be delivered from miseries of the present and of the future life. There are likewise many Mantras or mystical formulæ used in addresses for obtaining the favour of any particular Divinity : also, when presenting some offerings, &c. All such Mantras are in Sanscrit, but written in Tibetan character. There are in the Asiatic Society's Library many works on similar subjects."

The Secretary submitted for the inspection of the Meeting, facsimile Inscriptions, sent down by Lieutenant A. Cunningham, reporting at the same time, that having had these Inscriptions translated, they do not possess any thing of interest or novelty to require any further specific notice.

With reference to Dr. Forbes' communication on the discovery of a complete copy of the *Jami ul Tawarikh*, printed in the 107th Number of the *Journal of the Asiatic Society*, the following communication was read from H. M. Elliot, Esq., of Allaha-bad, of 20th September :—

" Not having yet observed any notice of *RUSHEED-OO-DEEN's* book at your periodical Meetings, I think it proper to bring to your notice a circumstance which came to my knowledge about two months ago, and which I should have mentioned earlier, had I thought it would have escaped observation so long. An anonymous work on History, bearing the same titles of chapters as *RUSHEED-OO-DEEN's* was brought by (the late) Sir JOHN MALCOLM from Persia, and presented to the College at Fort William, of which your Society has the Library. The work was copied at (I think) Casbin in 2616, and bears the title of *Jami-oo-Tuwareekh Judeem*, but without name of the author. This information I obtained one day from Stewart's Catalogue of Tippoo Sultan's Library, and I now communicate it, after this long delay, in the hope that a little search in your own archives will reward you with the discovery of this valuable work."

A search having been made as suggested by Mr. ELLIOT for the book, the Secretary had the satisfaction to report to the Meeting, that it was found, and the volume submitted to inspection.

The presentation by Moulvee Abdool Ruheem of a copy of the translation by him in Persian of the *Kamoos* was acknowledged by the Society by a vote of thanks, and the presentation in return to the Moulvee of all the Arabic works printed by the Society.

The Secretary submitted to the inspection of the Committee a folio containing Sketches by Lieutenant Colonel Salter, of the (late) 2d Regiment Light Cavalry, taken by him during his service in Afghanistan.

For these presentations and contributions, the thanks of the Society were accorded.

Proceedings of the Asiatic Society.

(Friday Evening, 3rd December, 1841.)

The Hon'ble Sir EDWARD RYAN in the Chair.

The Reverend WM. WINCHESTER, Chaplain at Berhampore, proposed at the Meeting of the 11th November last, was ballotted for and duly elected.

Ordered, that the usual communication of his election be made to the Reverend W. WINCHESTER, and that he be furnished with a copy of the rules of the Society for his guidance.

Library.

Books received for the Library of the Asiatic Society for the Meeting of the 3d December, 1841.

The Annals and Magazine of Natural History, vol. 7, Nos. 45 and 46, July and

August, 1841,	<i>No. of Copies.</i>	2
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Edinburgh New Philosophical Journal, by Professor JAMESON, No. 61, April

[illegible]

Calcutta Christian Observer, December, 1841, new series, vol. 2d, No. 24, .. 1

Bulletin de la Société de Géographie, 2d series, tome 14, 1

Journal des Savans for April, 1841, Paris, 1

Letter addressed to the Government of Bombay by the Chamber of Commerce

at the Presidency, 1841,	1
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Liber As—Sojuttii de nominibus relativis, Lugduni, Bat. 1840, 1

Read letter from the Secretary to the General Committee of Public Instruction of 26th November last, forwarding such Oriental books mentioned in the following list, as can be spared from the Library of the Education Committee :—

List of the Oriental Books, forwarded for the Library of the Asiatic Society.

SANSKRIT WORKS.

[illegible][illegible]

Mudra Rakshaha, 1

Mugdhabodha, 1

Bhatti Kavya, 2 vols.	1
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Raghu Vansa,

Sahitya Durpon,]

Kavya Prokasa.
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Bhasa Parichhed,]

Mricha Kati, I

Munu Sanghita. 2 vols.	1
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Viayusta Ratnamalah,	1
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Duttuck Chundrica and Mimansa,	1
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Law of Inheritance,	1
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[illegible][illegible]

Wilson's Dictionary,....	1
Bebaud Chentamony,	1
Malatee Madhava,	1
Retnavoli, ....	....	....	....	....	....	....	1
Khetro Tutto Depica, ..	....	....	....	....	....	....	1

PERSIAN AND ARABIC WORKS.

Kyfayah, 4 vols. ....	....	....	....	....	....	....	1
Suddedee, ....	....	....	....	....	....	....	1
Fussoli Abqrat, ....	....	....	....	....	....	....	1
Mill's Bridge's Algebra, ....	....	....	....	....	....	....	1
Shanamah, ....	....	....	....	....	....	....	1
Mujumah Sumshi, ....	....	....	....	....	....	....	1
Æsop's Fables,.. ....	....	....	....	....	....	....	1
Syer Mutakherin, ....	....	....	....	....	....	....	1

Total No. of Copies, 29

Read letter dated Simla, 16th November 1841, from Capt. J. T. BOILEAU of the Engineers, forwarding an account of the Meteors which appeared there on the night of the 12th idem, in sufficient quantities to establish the fact of their excess over ordinary occurrences of the kind.

Read a 4th Memoir on the Law of Storms in India, being remarks and documents relative to the loss of the ship *Golconda* in the Tyfoons of 22d to 24th September 1840, in the China Sea, by H. PIDDINGTON, Esq.

Read remarks by Capt. J. T. Boileau, Bengal Engineers, on the Construction of Newman's improved Portable Barometer, and on the mode of renewing the Gauge Point when lost, with a drawing.

The Secretary also submitted to the inspection of the meeting, a Perpetual Moon Table by Capt. R. SHORTEDEE, who on a former occasion favored him with a Perpetual Time Table.

The foregoing Papers and Table, the Secretary noticed, would appear in early numbers of his Journal.

Read the following Report of the Curator for the month of November last:—

SIR,

During the brief period that has elapsed since the occasion of our last Meeting, but little has transpired that can be embodied in my present Report. Due progress has been made in determining and labelling the collection of Birds, which I trust will be entirely accomplished by our next Meeting. I have also commenced arranging the Insects, and shall soon have ascertained and labelled the order *Lepidoptera*, to the extent of my present means of determining the genera and species. The donations received for the Museum consist solely of Zoological specimens: viz. 1st, a Bat from DR. Cantor, being the third species of Indian *Taphozous* now in the collection, whereas I believe but one has hitherto been described from this part of the

world; 2dly, a skull of a species of *Lutra*,* and the lower jaw of a *Delphinus* (species undetermined, and where taken I was unable to learn, though it was believed somewhere on the high seas, and not in the vicinity of India), from Mr. C. Harvey; 3dly, 4 species of recent Birds, from W. Frith, Esq., of which three are new to the Museum; and 4thly, a fine recent *Crocodylus biporcatus*, 9½ feet long, shot and presented to the Society, at the suggestion of J. M. Seppings, Esq., by the Superintendent Engineer at the Government Steam Yard, — Jones, Esq.

The following Birds have mostly been shot by myself; a few have been purchased, and those presented by Mr. Frith to the Society are included:—

- Palæornis torquatus*, female.
- Falco tinnunculus*, do. in first plumage.
- Elanus melanopterus*, do. do.
- Haliæetus Pondicerianus*, do.
- Vultur leeuconotos*, preparing as a skeleton.
- Otus brachyotus*.

Coracias Indica, two male specimens, in a phase of plumage which warrants the suspicion that *C. Assamensis* (McClelland and Horsfield), of which we possess a specimen noticed in my last Report, entirely according with the description, is a variety merely of the common Indian Roller.

- Merops Indicus*, male and female.
- Alcedo Bengalensis*, male and female.
- Dendrocitta vagabunda*, male and female.
- Pastor tristis*, male and female.
- P. cristatellus*, male.
- P. cinereus ferdoa*, male and female.
- P. fuscus*, (?) Wagler; *P. Mahrattensis*, Sykes.
- Sturnus contra*, male.

Alauda, species undetermined, and apparently undescribed.

- Dicrurus baliassius*, sexes in different states of plumage.
- Chloropsis Malabaricus*, male in immature dress.
- Geocichla rubecula*, male.
- Calliope Lathamii*, female.
- Muscicapa cærulea*, male.
- Jora tiphia*, ditto.
- Anthus rufescens* (?), ditto.
- Motacilla alba* (vera), two very different males and a female.
- Pyrrhuloxia crucigera*, male.
- Columba tigrina*, male.
- Ardea Malaccensis*, male and female, immature plumage.
- A. Javanica*, Horsfield; *A. scapularis*, Wagler, young female.
- Sterna*, species undetermined, female.
- Tadorna Bellonii*, † male.

* I have since procured a recent animal of this genus, to all appearance the *L. vulgaris*, and the skull of which entirely accords with that above noticed.—*Cur. As. Soc.*

† In the Proceedings of the Zoological Society's for 1834, p. 50, Mr. Gould notices a specimen of the common Sheldrake from Trebizond, and remarks that it had not previously been observed

Pelicanus rufescens (?), Gmelin, * female.

Of these, the *Otus*, *Pastor pagodorum* and *P. fuscus*, *Alauda*, *Motacilla*, *Pyrrhulauda*, *Tadorna*, and *Pelicanus*, (seven species,) are new to the collection; and the remainder have replaced old and very inferiorly mounted specimens, and in several instances have added the other sex, in a different state of plumage to what was previously in the Museum

The only other *Vertebrata* procured, consist of a Squirrel (*Sciurus palmarum*), a fine specimen of the Dhamna Snake (*Caluber Dhamna*, Cantor), and the Crocodile before mentioned, which is in process of being set up, while its skeleton is also preparing, and several of the viscera have been preserved in spirits.

A number of Insects have also been collected in the neighbourhood; and several of the Bird Skins from Tenasserim and the Himalaya, noticed in my Report for last month, have been mounted. The present being the only season at which fresh specimens of animals will bear to be brought from any distance in available condition, I continue to spare no pains to induce the Shikarees and others to supply us with as many species as they can procure; the duplicates of many are valuable for purposes of exchange and transmission to other Museums, and while the examination of such enables me to gain a more thorough knowledge of their various kinds, a rectification of many synonyms will doubtless accrue from the intercourse which it is thus sought to establish with Museums in different countries, and which it is to be regretted is not more general and extensive than at present.

I am, Sir,

Yours obediently,

EDWARD BLYTH.

December 3rd, 1841.

Read letter from Mr. Secretary BUSHBY, of the 10th November last, transmitting copies of Registers of the rise and fall of the Tide at Prince of Wales' Island and Singapore, for the months of April, May, and June, 1841, together with transcript of a memorandum which accompanied the Registers.

Ordered—That the thanks of the Society be conveyed to the Government for the Registers in question.

For the Presentations and Contributions, the thanks of the Society were accorded.

out of Europe. Mons. Temminck, however, had already enumerated this species in his list of European birds met with in Japan, and it was obtained by the late Sir A. Burnes on the Indus. Here it would appear to be very rare, being quite unknown to our taxidermists.

* This agrees tolerably well with the description in Shaw's Zoology, (vol. XIII, pt. I, p. 114,) except that the feet are there stated to be yellow, whereas in our bird they were of a leaden black colour, slightly tinged with green, and the claws white.

ADVERTISEMENT.

The "Palæologica" I published in the year 1832, as well as my work on fossil bones of the country of Georgensgmünd (1834) and my palæontological treatises contained in the Transactions of Academies and various Natural Societies, were so favourably received, that since some years I have been honoured with specimens of similar fossil organic remains of a former world, which on examination, offered important matter for results about fossil bones of the Mammalia, Reptiles, and Birds. Whilst these rare treasures were imparted to me by public and private collections of Germany, Switzerland, and the adjacent countries, with a readiness deserving every encomium, I am requested from different parts, not to publish my inquiries separately, but in a particular work. In order to satisfy such unbounded confidence and kind desire, I am willing to advance a work under the above title referring to the Fauna of a primitive world, which will contain my inquiries about fossil bones. As it is impossible to give a complete insight with this advertisement, it will suffice, to form a judgment of its worth, by citing, that this work, among the rest, will treat—of fossil bones of Pachydermata (Mastodon, Rhinoceros, Palæotherium, Dinotherium, Tapir, Microtherium, &c.), Ruminantia (Palæomeryx, Orygotherium, &c.), Rodentia (Lagomys Oeningensis), Carnivora (Harpagodon, Pachyodon, &c.), Tortoises, Sauriens, Frogs, and Birds, which have been found in beds of Lignite or Brown-coal in Switzerland and in other deposits of Molasse in this country, as well as in the pits of pisiforme Iron ore or Möskirch, in the calcareous marl near Oeningen, the gypsum near Hohenhoven, in the strata near Weisenau, and in other tertiary strata; of the skeleton parts of the marine Mammalia, called by me Halianassa, which very well designates the upper tertiary formations of our part of the world; of remains of Sauriens, Tortoises, and Birds from the cretaceous group (in the canton of Glaris, &c.); of the Plateosaurus from the Keuper; of the teeth of the Ischyrodon; of Sauriens and Tortoises from the famous formation of the lithographic limestone of Solenhofen; by the co-operation of the President Baron Andrian and the Count Münster, of the re-

markable Sauriens of Muschelkalk (*Nothosaurus*, *Pistosaurus*, *Charitosaurus*, &c.) ; and of the other fossil vertebrated animals.

As to the present eager pursuit of historical investigations about the constitution of the earth and the development of its organic types of animal life, there can be no better evidence than the remains of animals in the crust of the earth, amongst which the vertebrated animals are no doubt of the greatest importance. Thus if we add the creatures produced by the earth in a primitive age to the number at present only, we are able to estimate the riches of the whole creation, and to explain the alternations resulting from the sublime laws of nature. I am confident, therefore, that the publication of a work like this, containing anatomical and geological discoveries of a former world, will be readily promoted.

The work will appear in several numbers, the price of which shall be calculated, as is customary with such works, after the number of sheets in German, printed in Latin letters in gr. 4°, and according to the number of tables in fol°. with plates after my own drawings, or executed after my immediate direction. As gain is not the object of this publication, the lowest price cannot be determined before I know the number of subscribers ; the number of copies will not exceed much the number required, and the price in every case, will not be higher than that of similar works. The subscribers will please to send their direction to the author by the post, or by well known libraries, but plainly written. The list of subscribers will be joined to the work.

HERMAN VON MEYER.

